Appendix B

Potential Range and Habitat Distribution Maps

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Appendix B
Potential Range and Habitat Distribution Maps

1. Overview

This appendix describes the methodology for developing potential range and habitat distribution maps, and includes the maps for a subset of the Species of Greatest Conservation Need (SGCN). These maps are referred to as "potential" habitat distribution maps because they depict range as areas with documented occurrences, as well as areas with suspected or possible occupancy based on the availability of suitable habitat and the proximity of that suitable habitat to occupied areas. This information is intended to be used in conservation planning, for example to identify and prioritize areas for population surveys or to determine priority areas for restoration.

Why only selected SGCN?

Since these maps are based on occurrence data, we could only develop maps for those species for which sufficient data existed in our database. We also prioritized species for map development based in part on WDFW's need for spatial distribution data. For example, we prioritized some species for which the agency plans to prepare status assessments in the near future, as well as those included in the Habitat Conservation Plan for WDFW lands, currently in preparation. As we become more familiar with these map products and their utility for conservation planning, and as new data becomes available, we intend to develop additional maps for other SGCN as appropriate.

2. Methodology

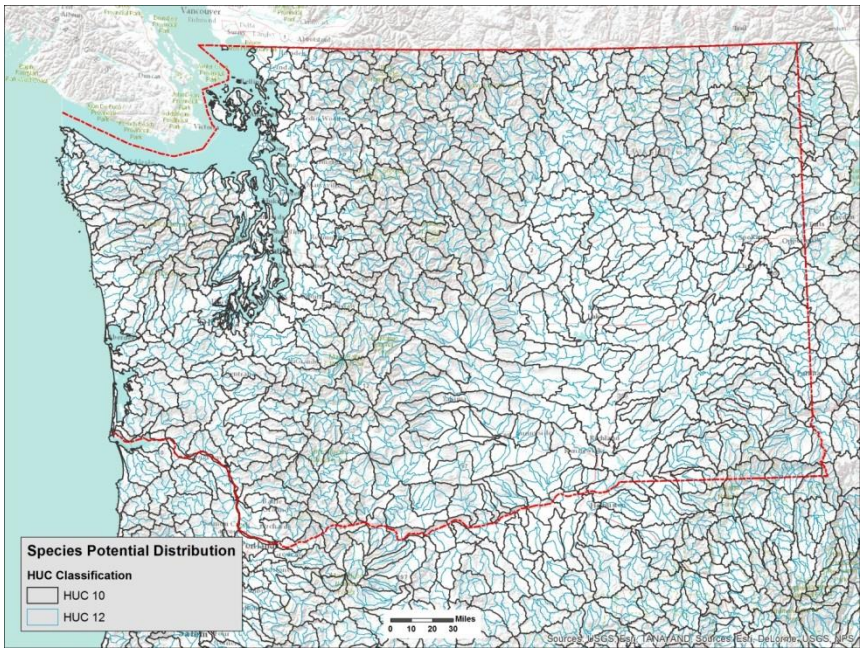
We defined species range as the geographic area in which a species regularly occurs within Washington, including areas used for breeding as well as important foraging, wintering, or migration areas where appropriate. We chose to spatially represent range using watershed boundaries (hydrologic units) at various scales and we used ecological systems[1] as the basis for representing potentially suitable habitat distribution of the species within its range. Each step in the process is described below, using the example of the Washington Ground Squirrel.

Step 1: Select range units and scale

We used the United States Geologic Survey (USGS) Hydrologic Unit Code (HUC) national watershed classification system to delineate range. The United States is divided and subdivided into successively smaller hydrologic units which are classified into various levels. The hydrologic units are nested within each other, from the largest geographic area to the smallest. Each hydrologic unit is identified by a unique code (HUC), indicating the relative scale. We selected two units to delineate range; HUC 12 (smaller) and HUC 10 (larger - see figure 1 for the distribution and relative size of HUC 10 and HUC 12 watersheds throughout Washington).

[1] Ecological Systems are a component of the National Vegetation Classification Scheme (NVCS) and have been used through the State Wildlife Plan Update to describe habitat needs of SGCN.

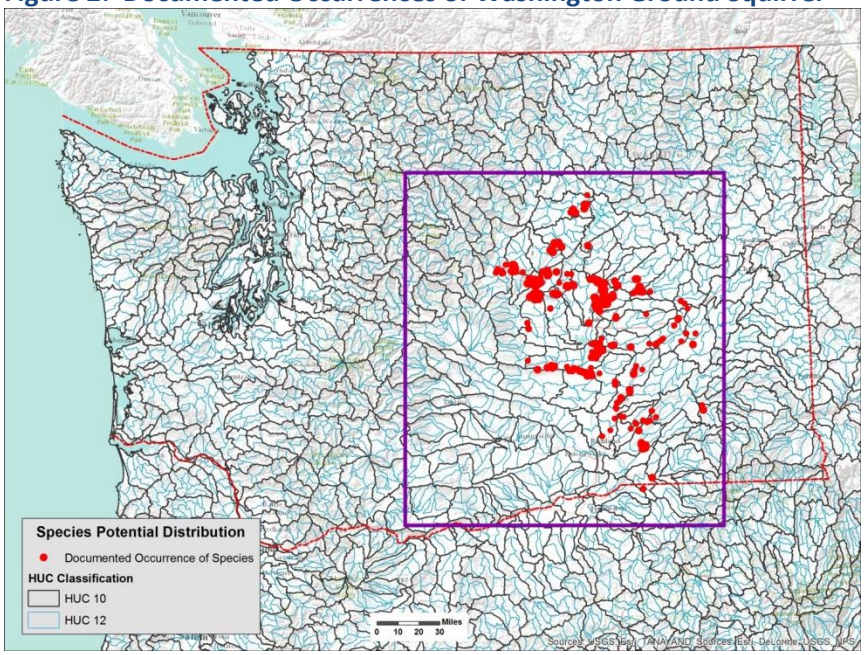
Figure 1: HUC 10 and HUC 12 Distribution in Washington



Step 2: Map species occurrence data within watersheds at smallest scale (HUC 12)

Species occurrence data from the WDFW database was mapped as they occur in HUC 12 watersheds. This data used is considered high accuracy occurrence data from 1978 to 2015 (figure 2).

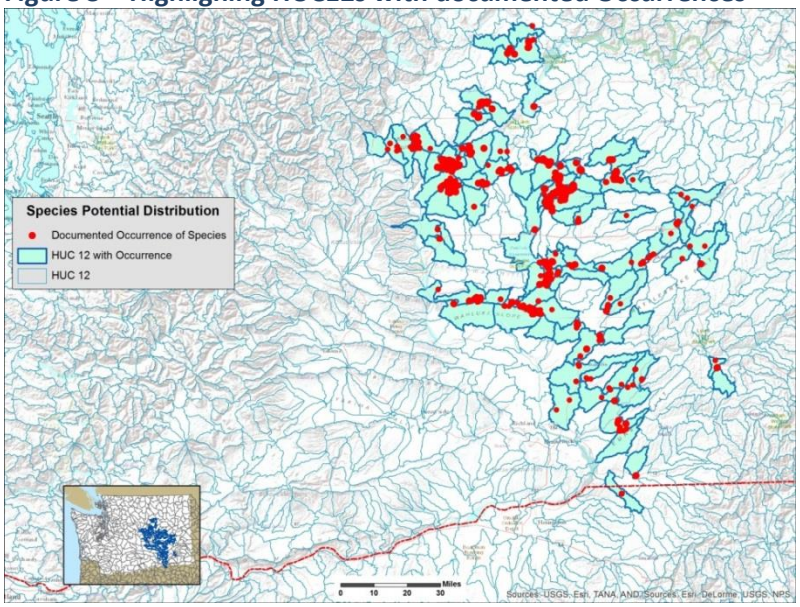
Figure 2: Documented Occurrences of Washington Ground Squirrel



Step 3: Select HUC 12s

Next, HUC 12s, the smaller watershed-based range units, were selected as core range. This preliminary list was then edited by WDFW biologists who used empirical data and literature to determine extant, incidental, accidental, and infrequent occupancy status for HUC 12s. The resulting HUC 12 selected watersheds represent the highest degree of certainty in depicting the current species range (figure 5).

Figure 3 – Highlighing HUC12s with documented Occurrences



Step 4: Identify suitable habitat for habitat distribution

We defined habitat distribution as the spatial arrangement of ecological systems suitable for a species within its predefined range. Species associations were defined on a species-by-species basis for 98 ecological systems in Washington. Biologists used expert knowledge and published habitat associations (Rocchio and Crawford 2008) and preferences to associate ecological systems to species using four categories, closely associated, generally associated, unsuitable, and unknown (figures 3 and 4). It should be noted that associated habitat and habitat distribution refers here to the extent of ecological systems with which a species is associated. Some, if not all species, respond to finer scale habitats such as vernal pools or forest stand age that cannot necessarily be mapped but may drive where a species occurs.

1. ***Closely Associated.*** The species demonstrates preference for the ecological system, as indicated by greater occurrence, high densities, greater reproductive output, or other indicators of preference, than in other ecological systems. A species that is closely associated to individual ecological systems often rely on one to a few ecological systems for a significant part, or all, of its life history requirements.

2. ***Generally Associated***. The species occurs in, but does not prefer, the ecological system, as indicated by lesser occurrence, lower densities, or other indicators of a general relationship with the ecological system. A species that is generally associated with individual ecological systems can typically rely on numerous ecological systems to meet its life history requirements.

Note: A species can be closely associated with some ecological systems and generally associated with others, given differences in occurrence, densities, reproductive output, or other indicators of preference.

3. Unsuitable. A species demonstrates no use or only occasional use of the ecological system.

4. Unknown. The species' use of the ecological system is unknown. There were questions or uncertainty whether or not a species used an ecological system.

Figure 4 – Associating SGCN with suitable habitats

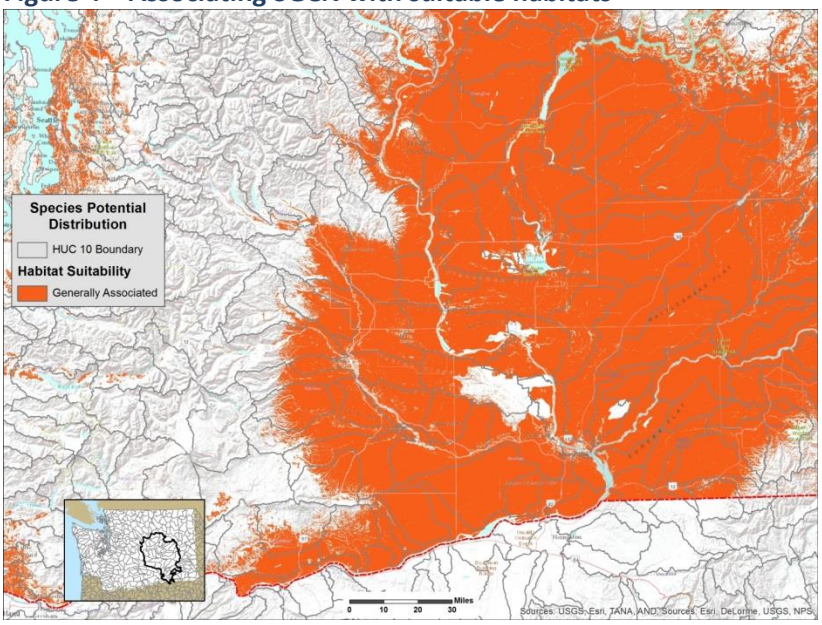
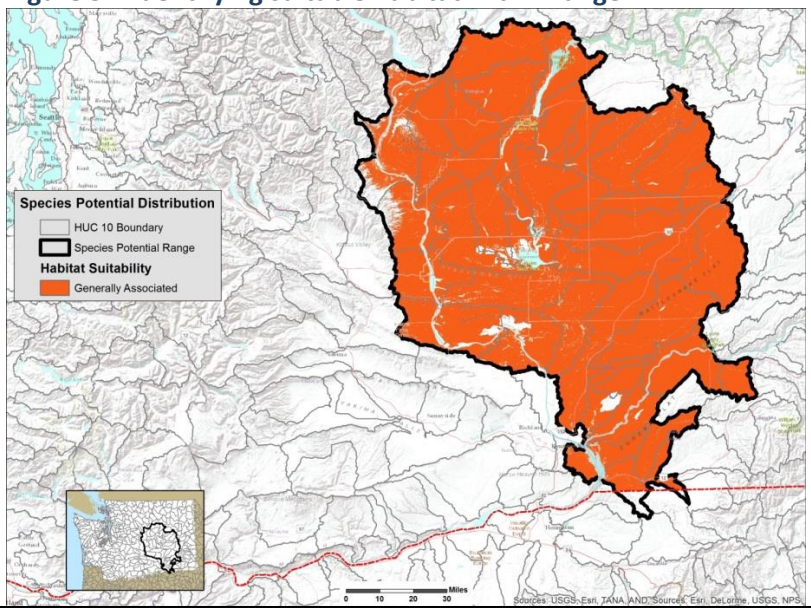


Figure 5 – Identifying suitable habitat within range

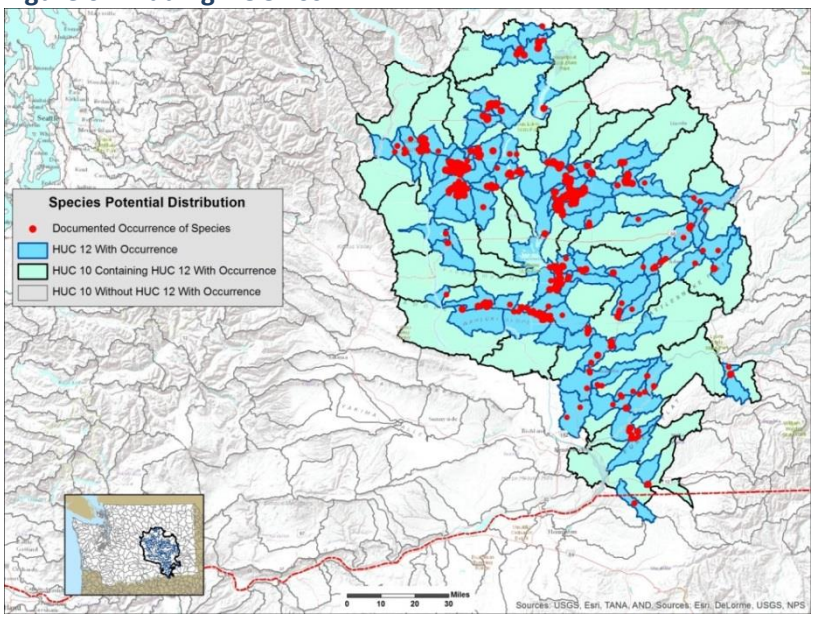


Note: this particular species happens to have only generally associated habitat - other species with closely associated habitat would have those areas marked in blue.

Step 5: Selectively highlight adjacent HUC 10s

Since the HUC system is hierarchical, each HUC 12 is nested within a larger HUC 10. The next step was to highlight the entire HUC 10 watershed as potential range, if suitable habitat exists, given proximity to known occurrences. Decisions to add the HUC 10 to a species' range included consideration of proximity to occupied range units, suitable habitat, and areas known to be subject to conservation action (reintroduction, translocation, and restoration – figure 5). In some cases, HUC 10's were not selected if the extent of the HUC 10 overrepresented where a species might occur. These assessments were made on a species-by-species basis by staff biologists.

Figure 6 – Adding HUC 10s



3. Considerations for Use

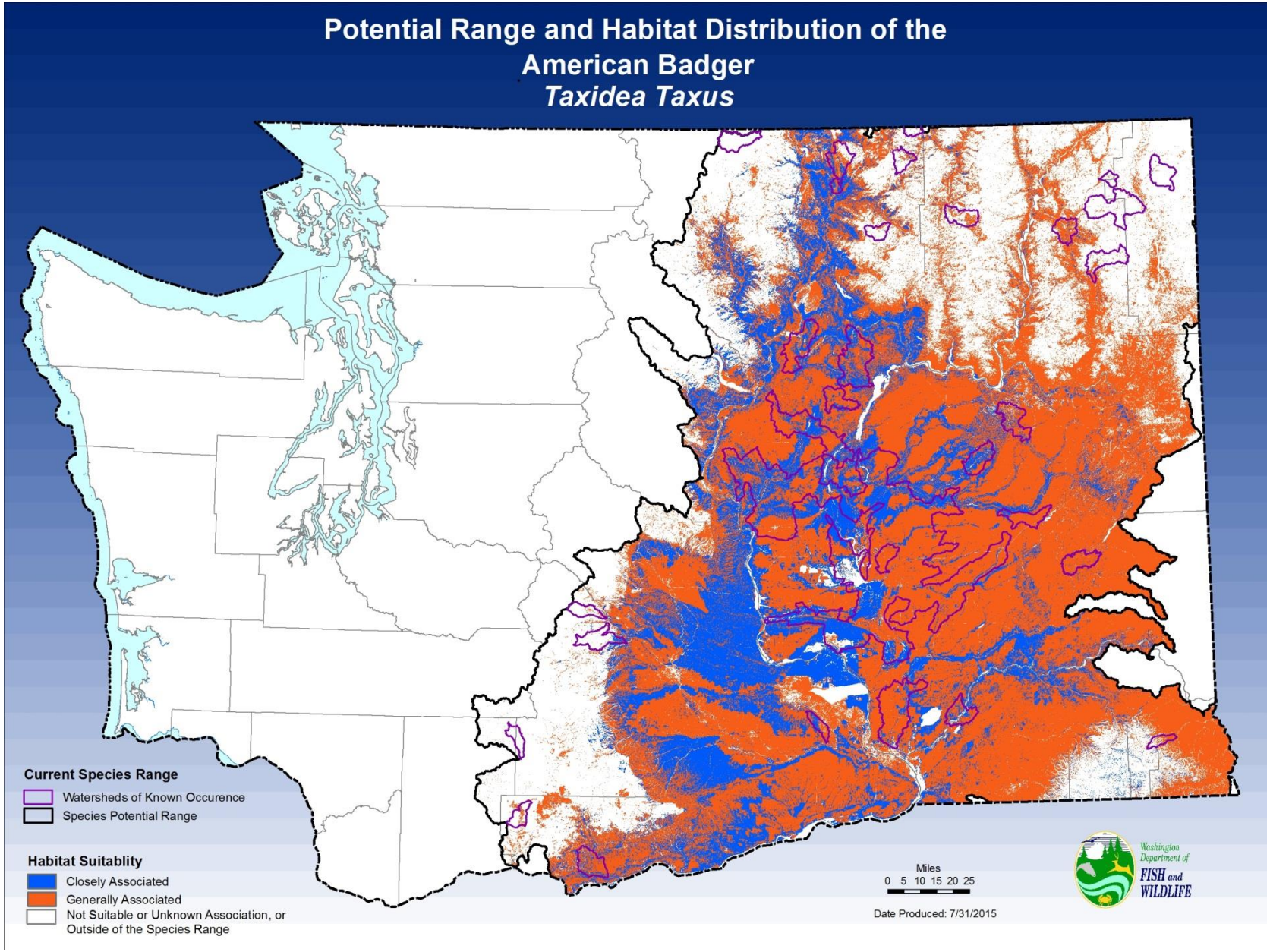
As mentioned in the Overview to this section, these maps are intended to be used to inform conservation planning at fairly broad scales to determine the most effective places to direct conservation investment. They will also serve as a guide for directing survey effort in areas that are thought to contain suitable habitat but for which no observations for a species exist. These activities are expected to lead to a further refinement of species ranges, mapped ecological associations, and associated habitat designations. The maps are not meant to replace existing range maps that may be in use for species recovery planning or in other regulatory processes such as establishing critical area ordinances. They are also not meant to identify specific places for conservation action but rather guide further evaluation within watersheds as to where the most appropriate conservation actions might take place.

Keeping maps relevant

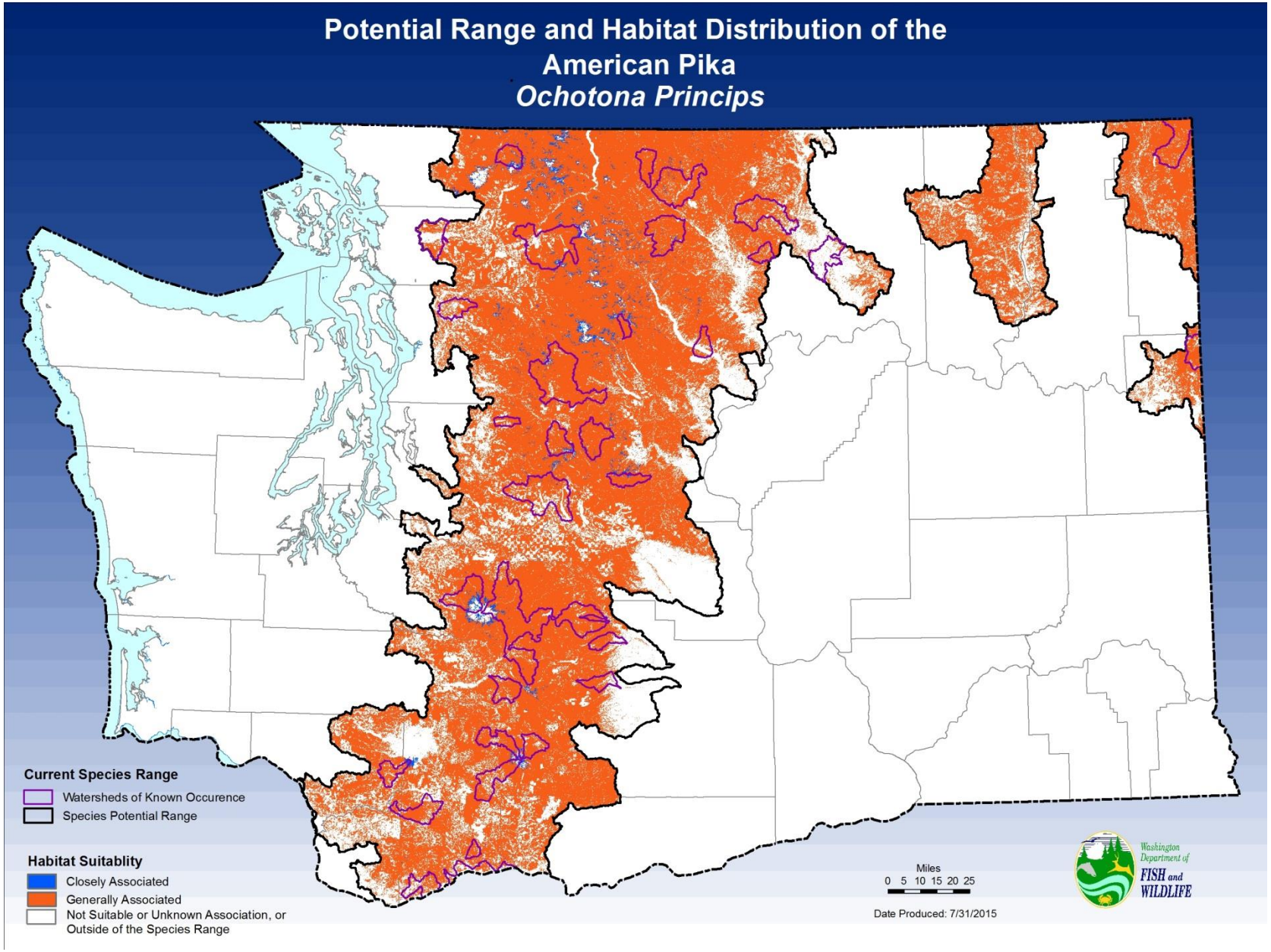
These map products are intended to be dynamic through links to WDFW cooperatively managed and other public domain wildlife occurrence datasets. Thus, new occurrences will be used to improve our range map products and keep them relevant over time. WDFW also has strong data sharing partnerships with U.S. Forest Service, Bureau of Land Management, eBird, and other organizations and intends to incorporate new partner data into our range map update process upon subsequent releases.

4. Range and Potential Habitat Distribution Maps for Selected SGCN

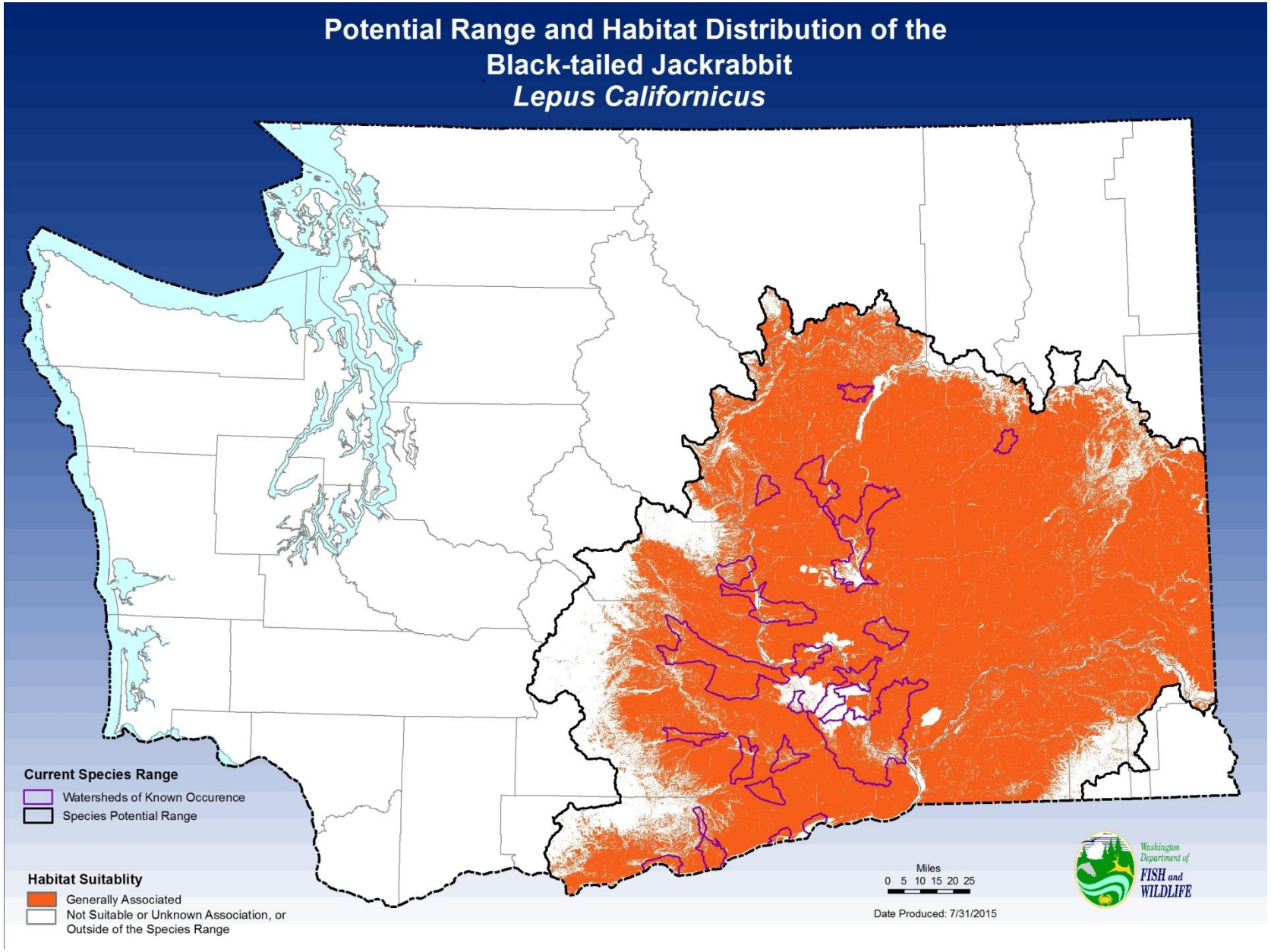
American Badger



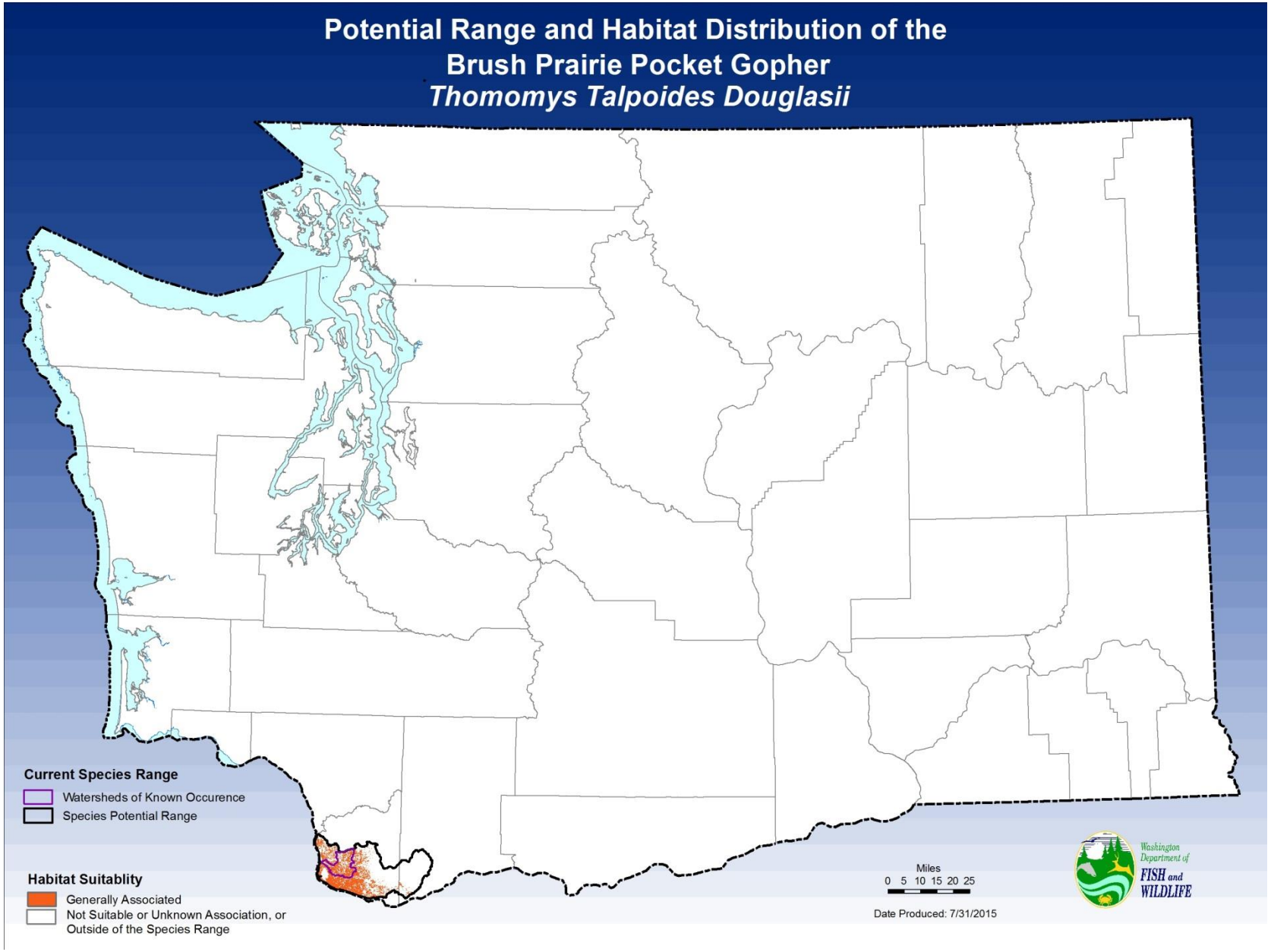
American Pika



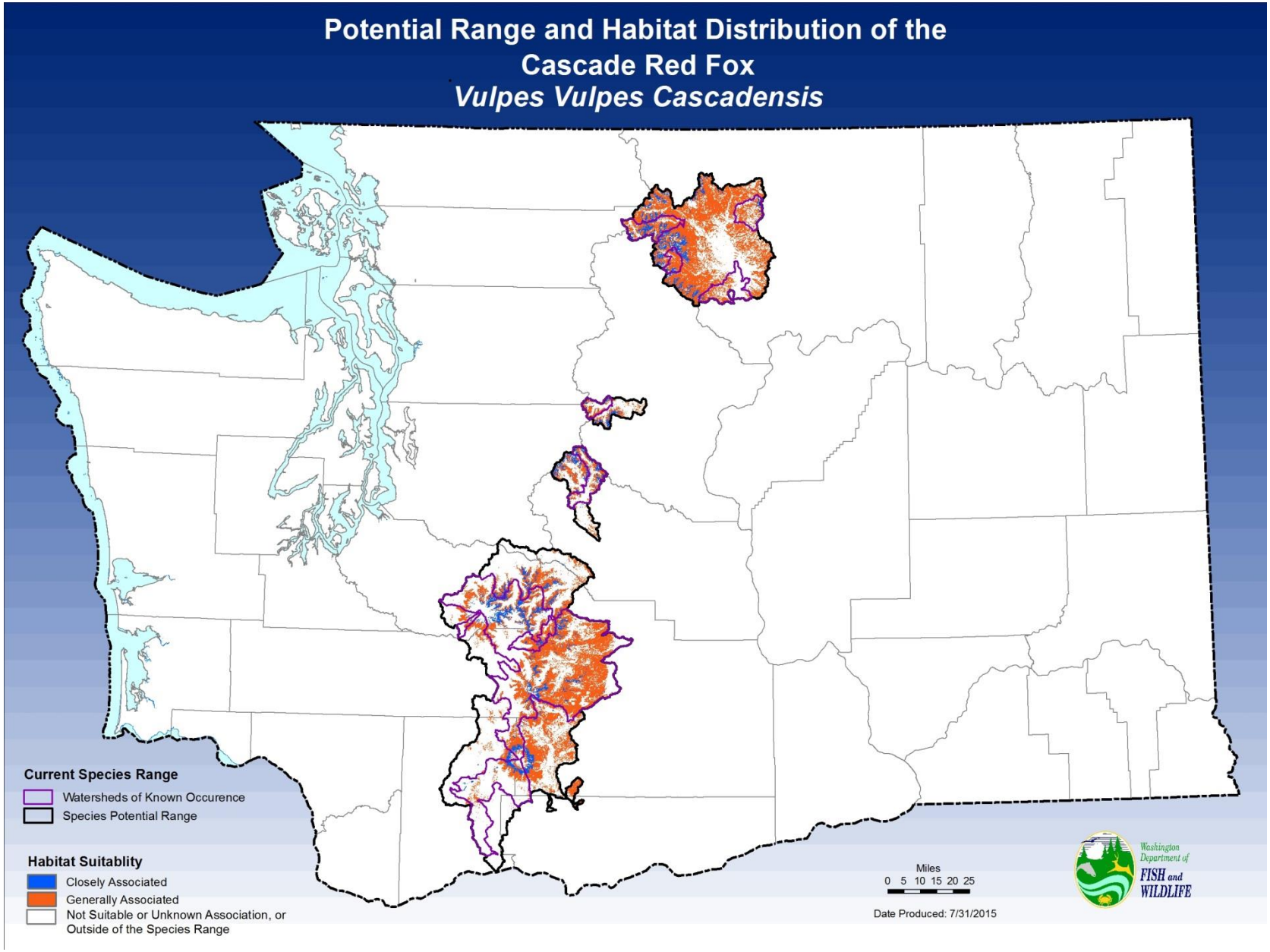
Black-tailed Jackrabbit



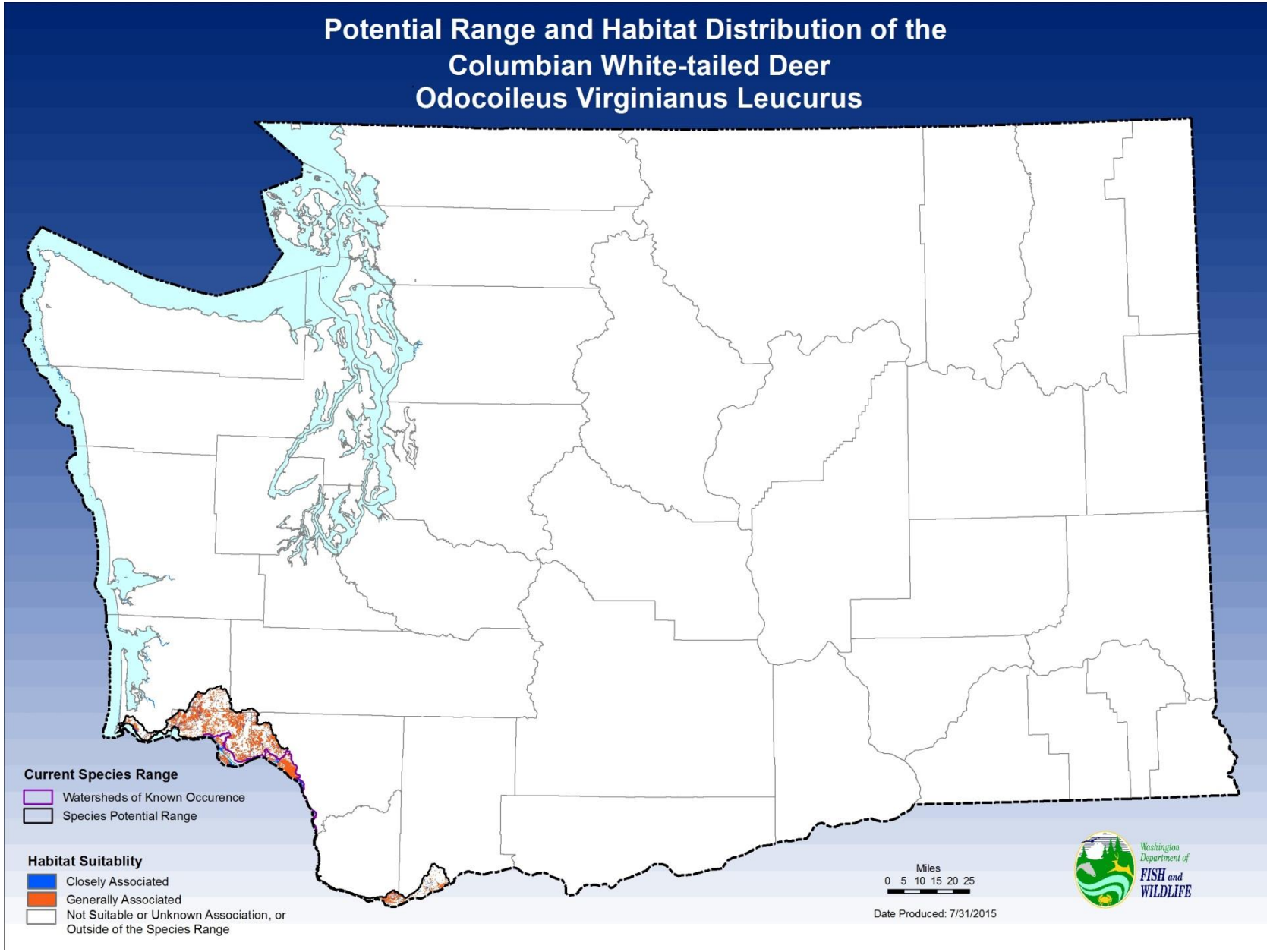
Brush Prairie Pocket Gopher



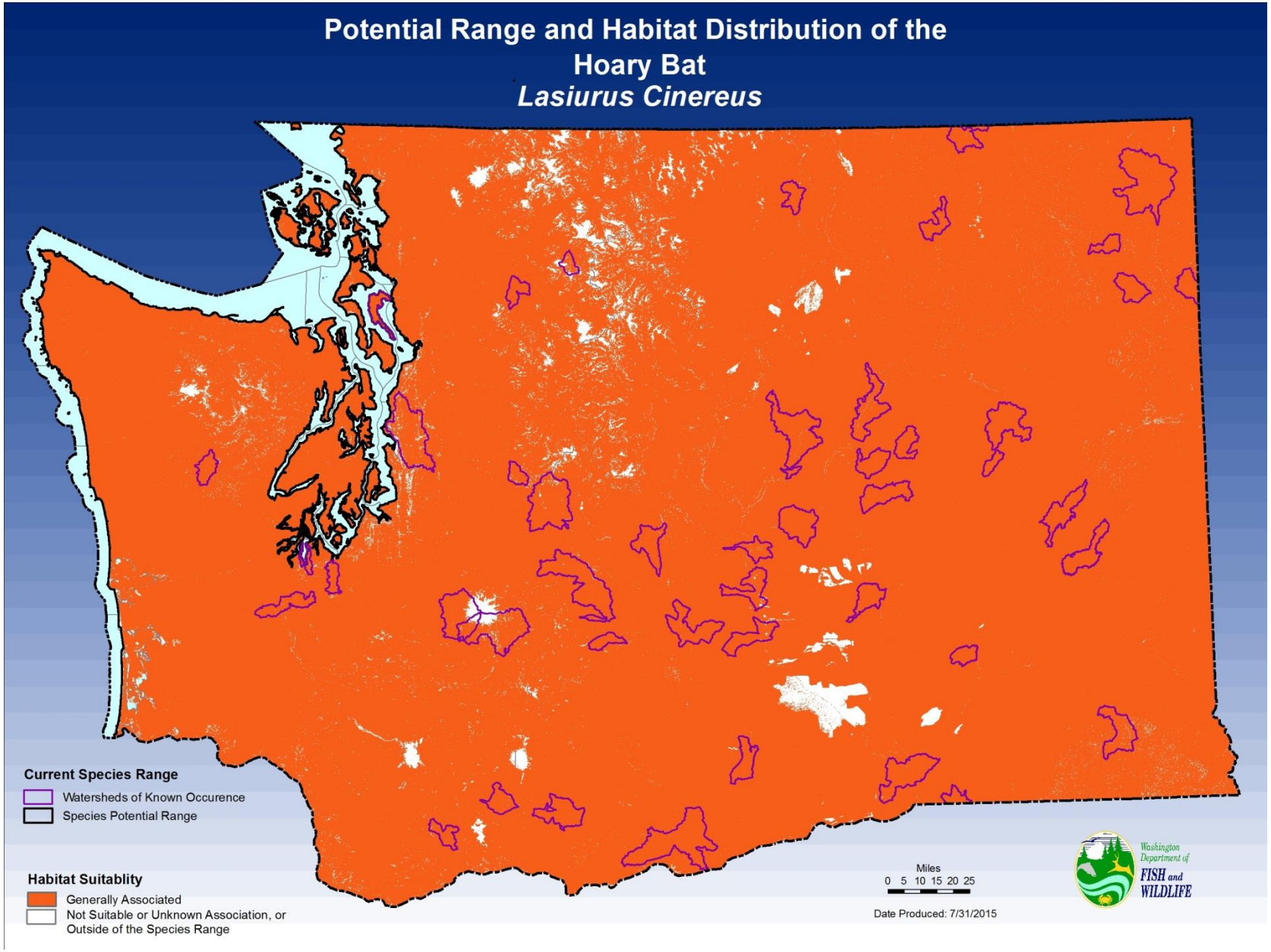
Cascade Red Fox



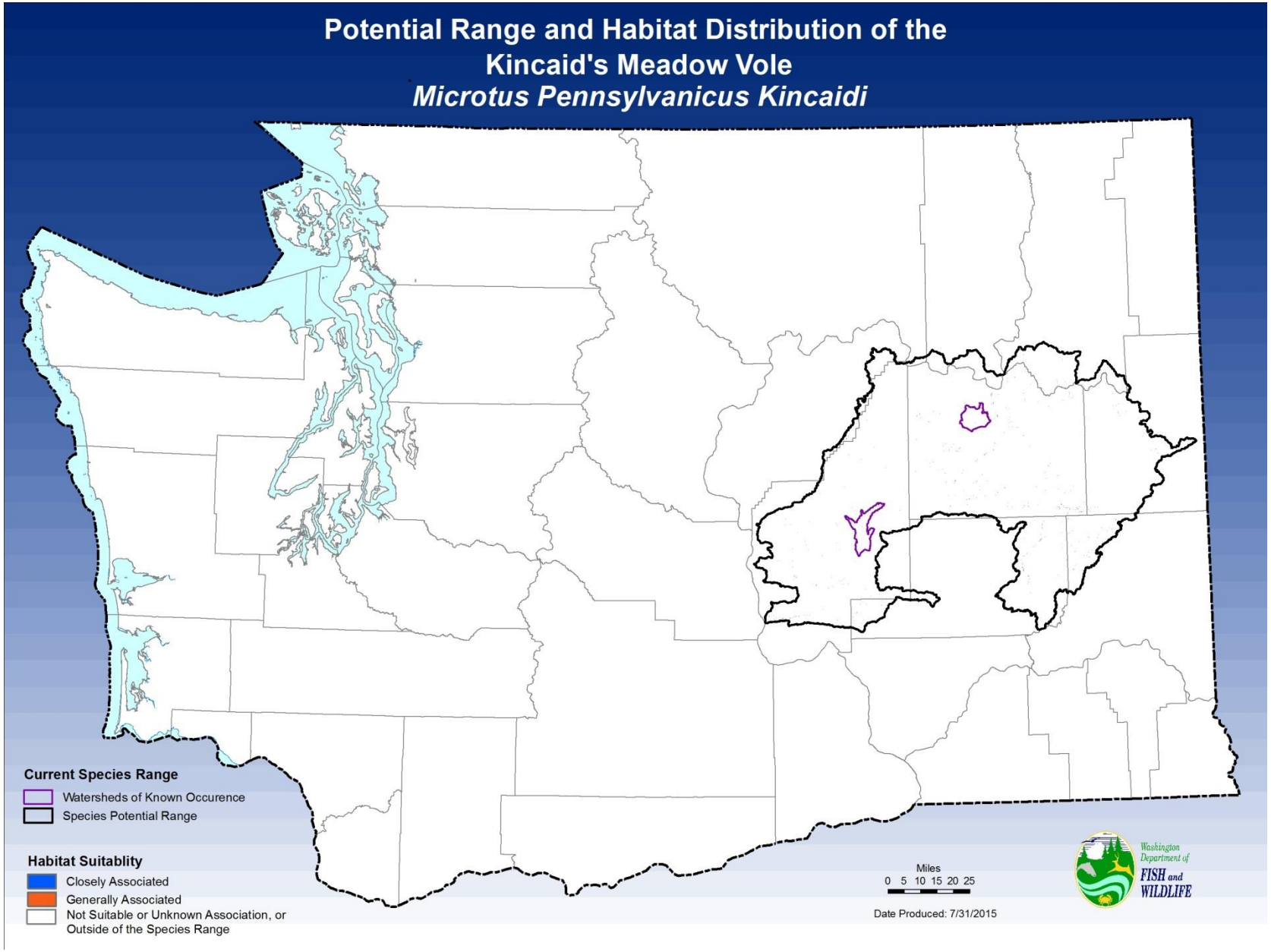
Columbian White-tailed Deer



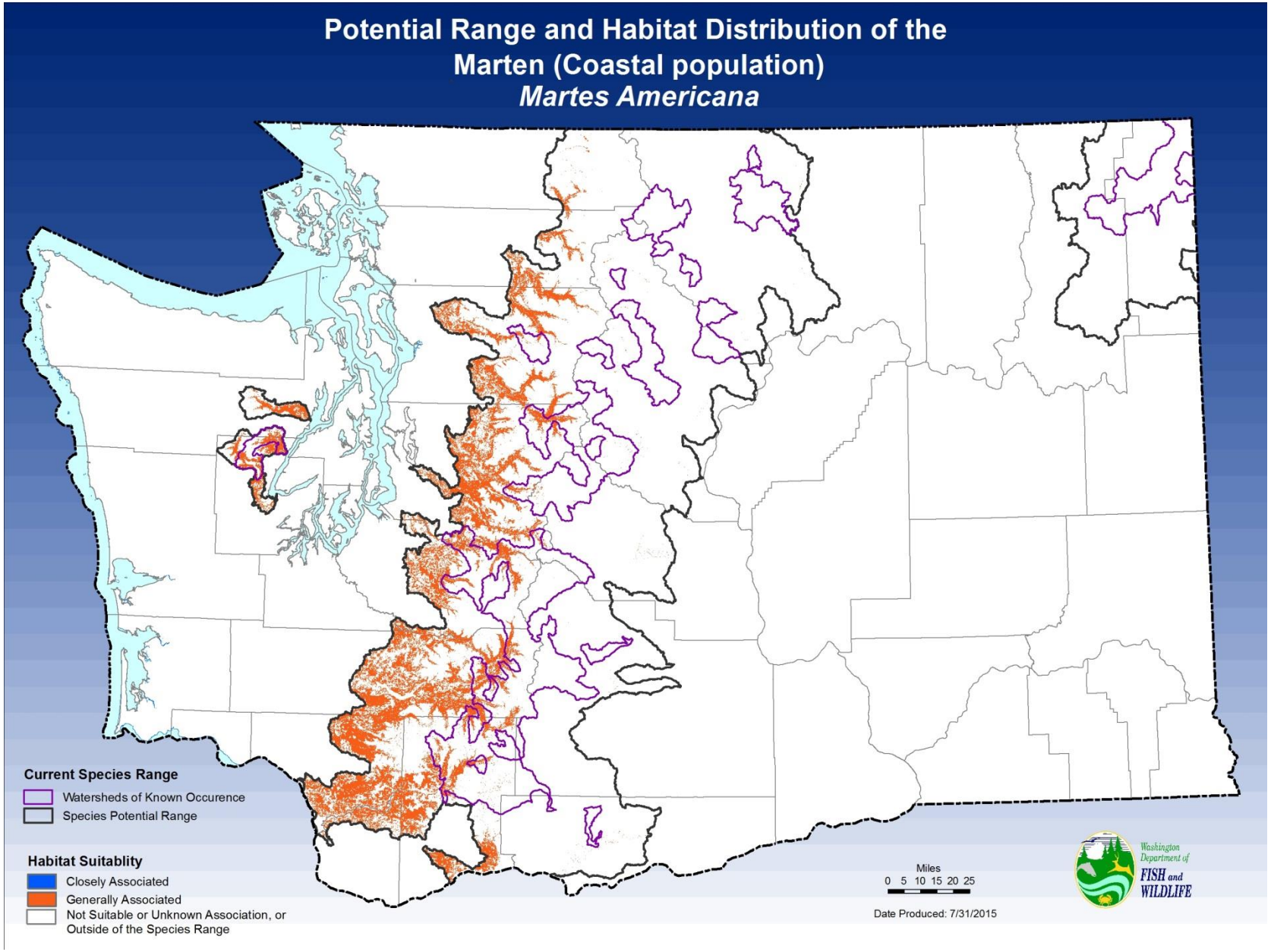
Hoary Bat


Potential Range and Habitat Distribution of the
Hoary Bat
Lasiurus Cinereus
Current Species Range
Watersheds of Known Occurence
Species Potential Range
Habitat Suitablity
Generally Associated
Not Suitable or Unknown Association, or
Outside of the Species Range
Miles
0 5 10 15 20 25
Date Produced: 7/31/2015
Washington Department of
FISH and
WILDLIFE

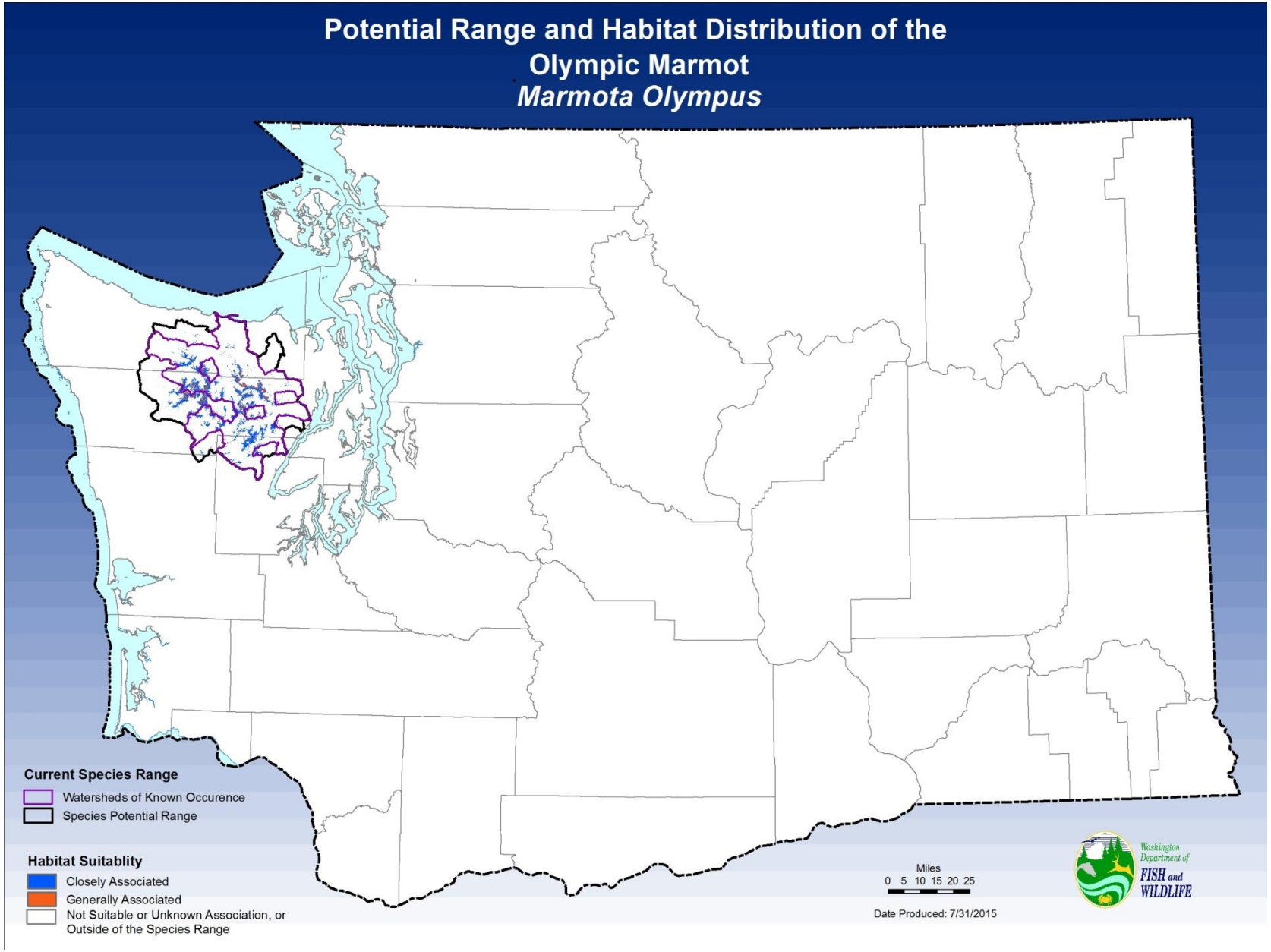
Kincaid's Meadow Vole



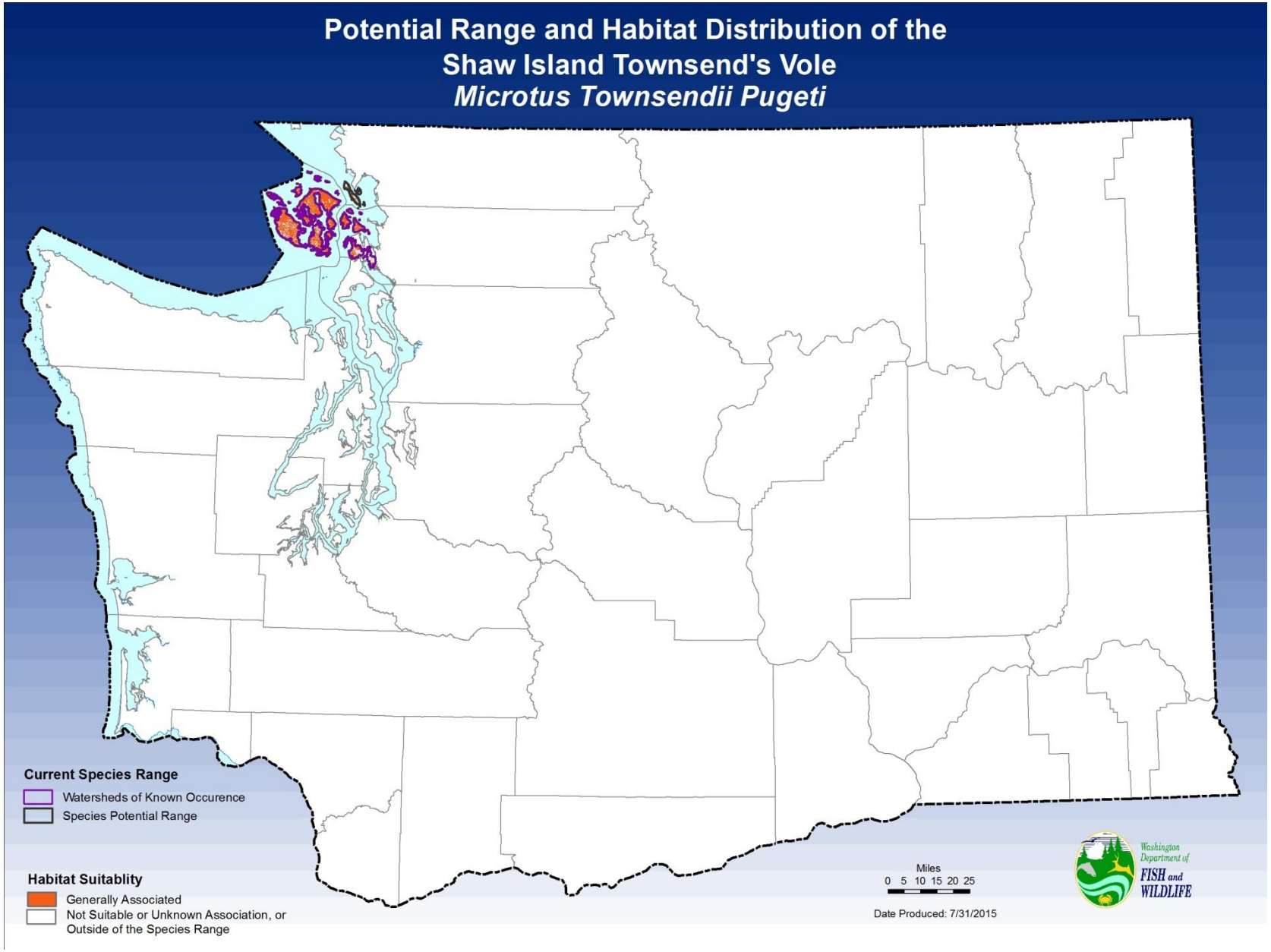
Marten (Coastal Population)



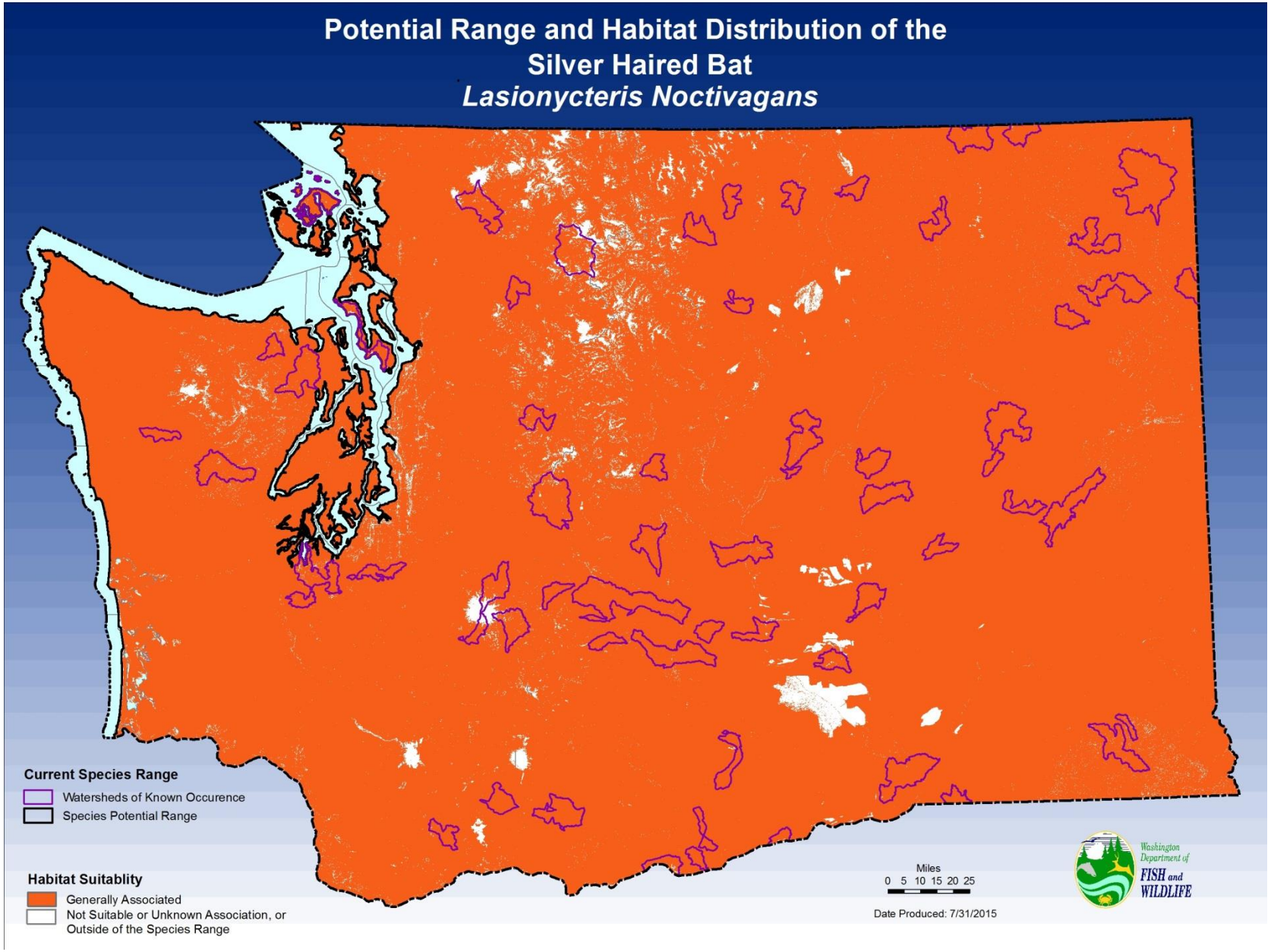
Olympic Marmot



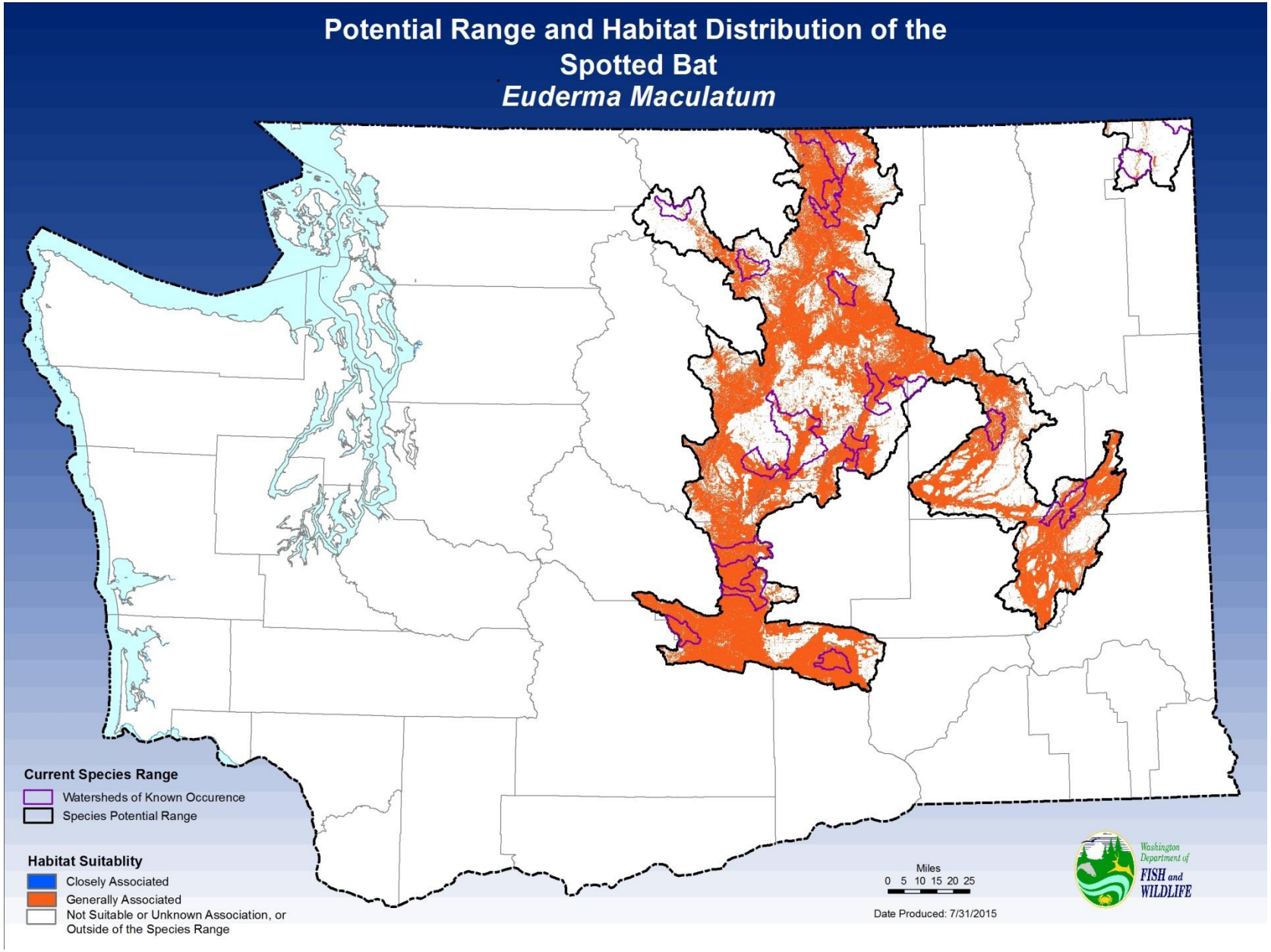
Shaw Island Townsend's Vole



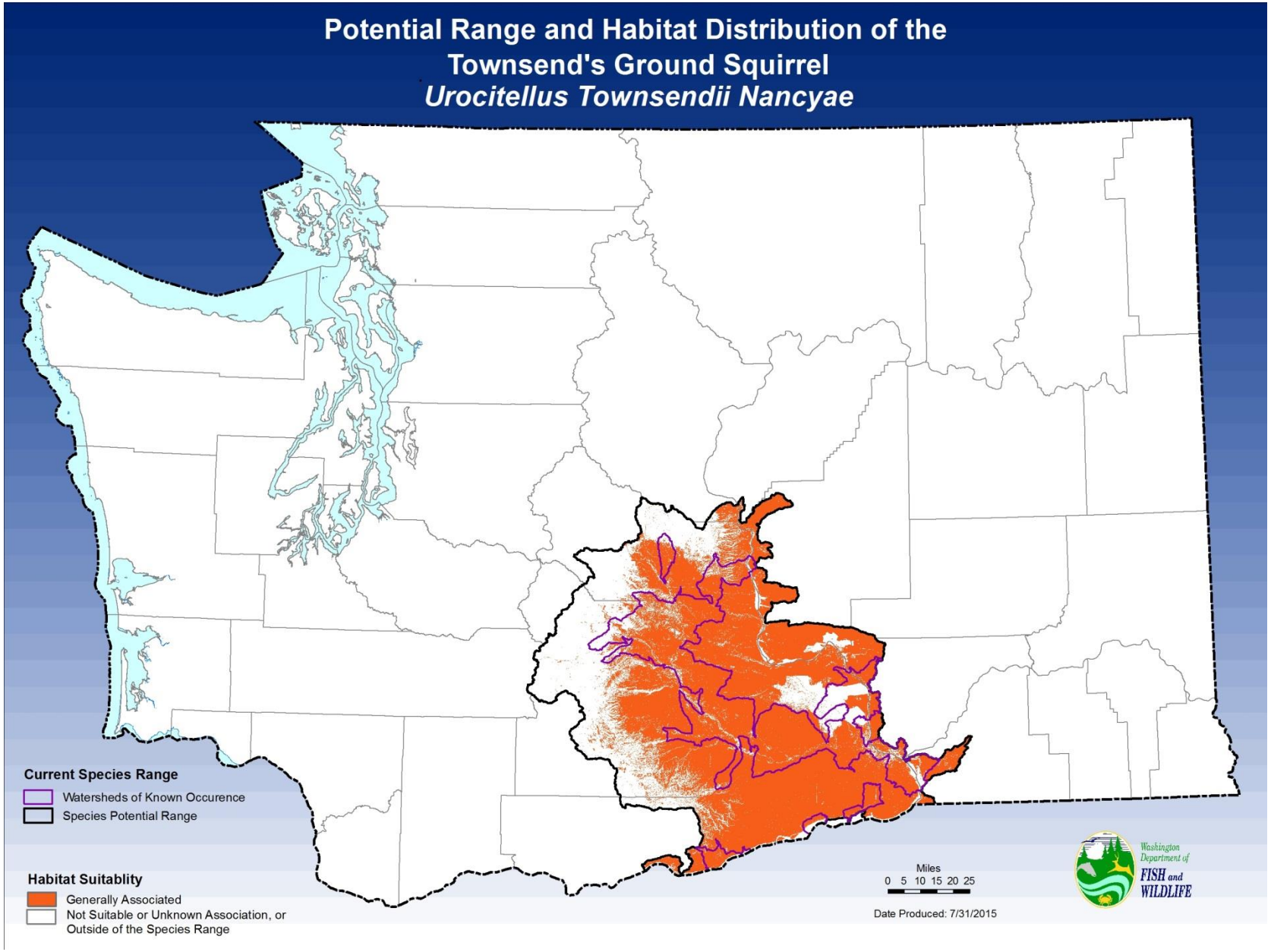
Silver Haired Bat



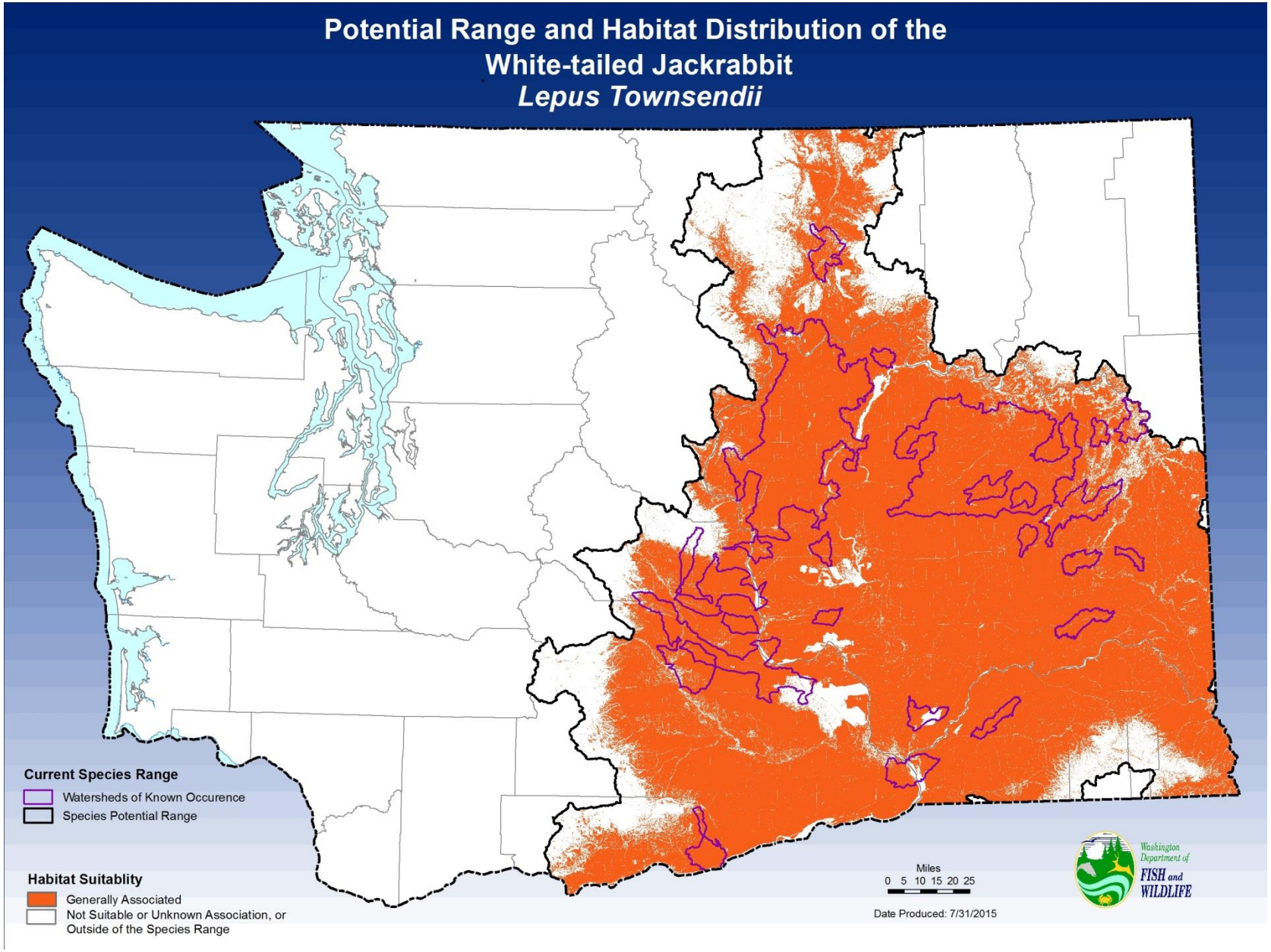
Spotted Bat


Potential Range and Habitat Distribution of the
Spotted Bat
Euderma Maculatum
Current Species Range
Watersheds of Known Occurence
Species Potential Range
Habitat Suitablity
Closely Associated
Generally Associated
Not Suitable or Unknown Association, or
Outside of the Species Range
Miles
0 5 10 15 20 25
Date Produced: 7/31/2015
Washington Department of
FISH and WILDLIFE

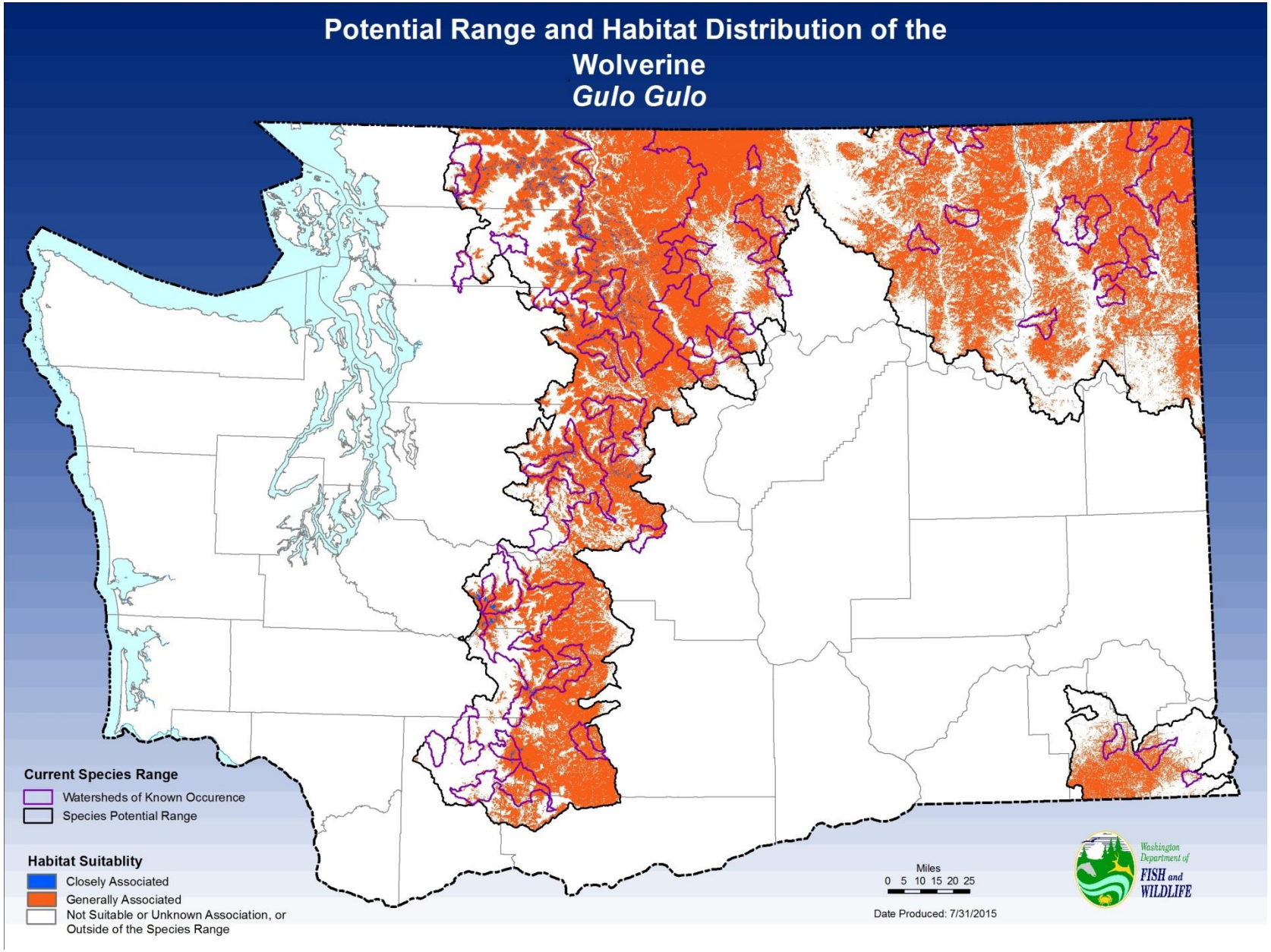
Townsend's Ground Squirrel



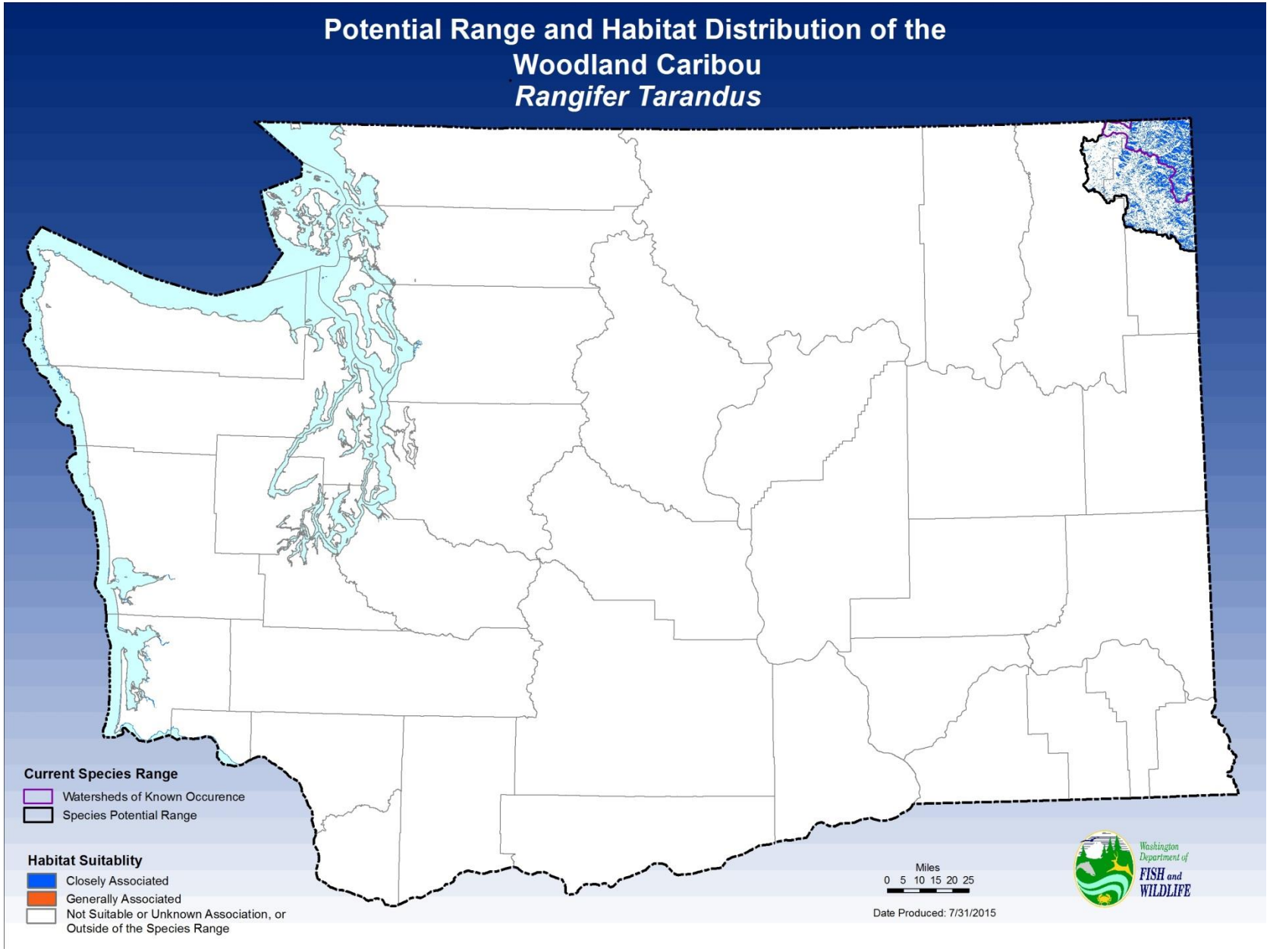
White-tailed Jackrabbit



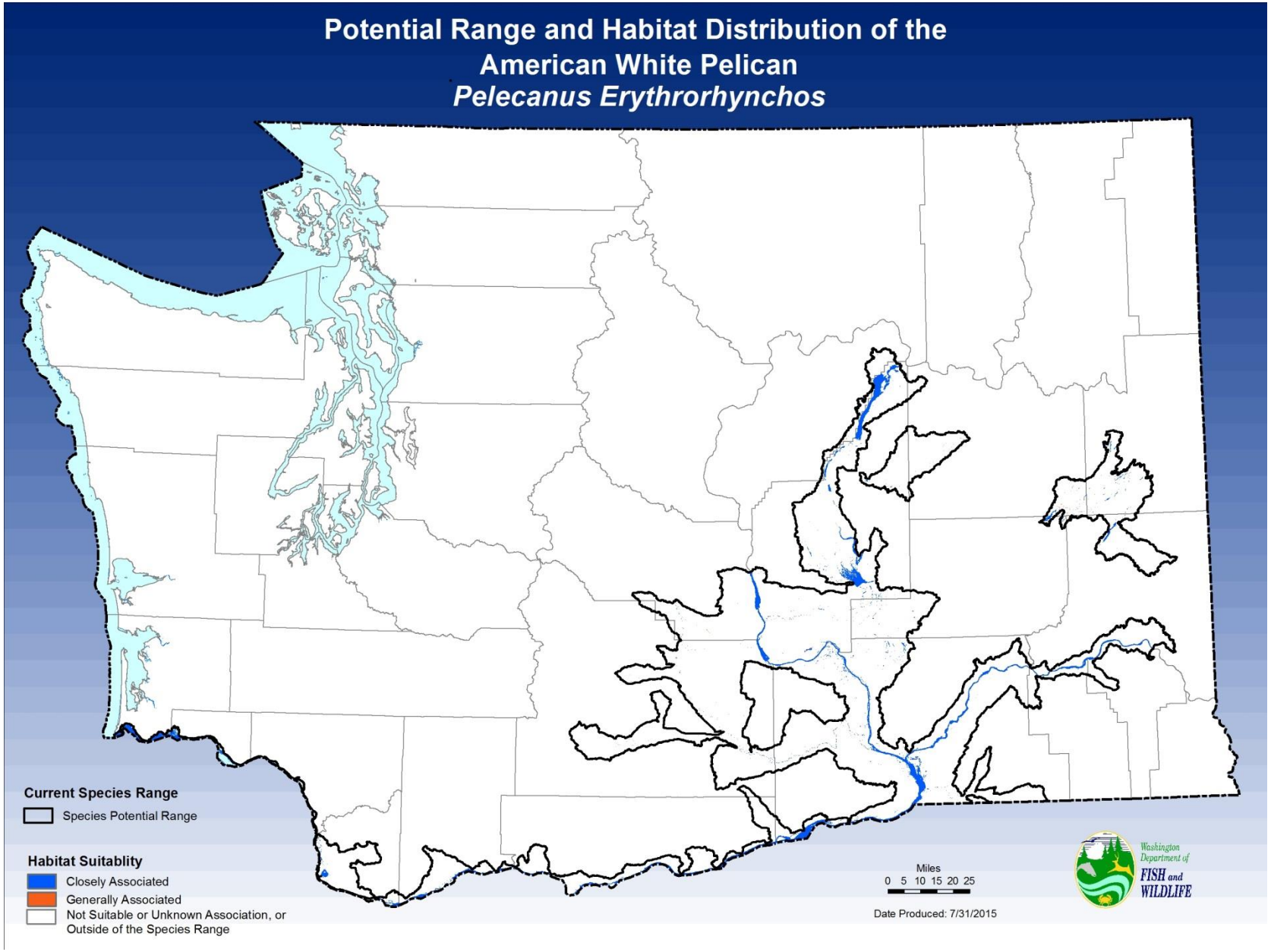
Wolverine


Potential Range and Habitat Distribution of the
Wolverine
Gulo Gulo
Current Species Range
Watersheds of Known Occurence
Species Potential Range
Habitat Suitablity
Closely Associated
Generally Associated
Not Suitable or Unknown Association, or
Outside of the Species Range
Miles
0 5 10 15 20 25
Date Produced: 7/31/2015
Washington Department of
FISH and
WILDLIFE

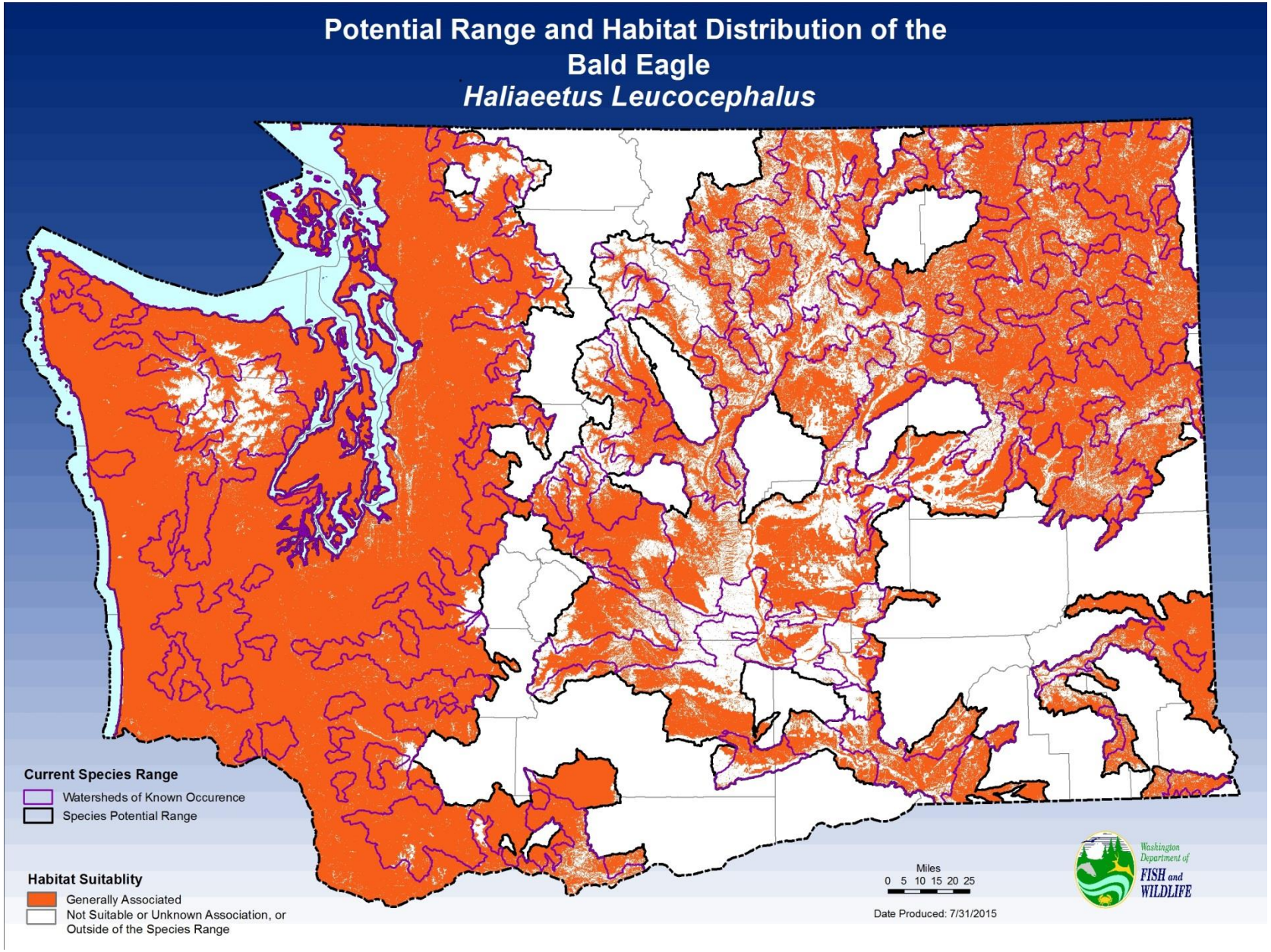
Woodland Caribou



American White Pelican



Bald Eagle


Potential Range and Habitat Distribution of the
Bald Eagle
Haliaeetus Leucocephalus
Current Species Range
Watersheds of Known Occurence
Species Potential Range
Habitat Suitablity
Generally Associated
Not Suitable or Unknown Association, or
Outside of the Species Range
Miles
0 5 10 15 20 25
Date Produced: 7/31/2015
Washington Department of
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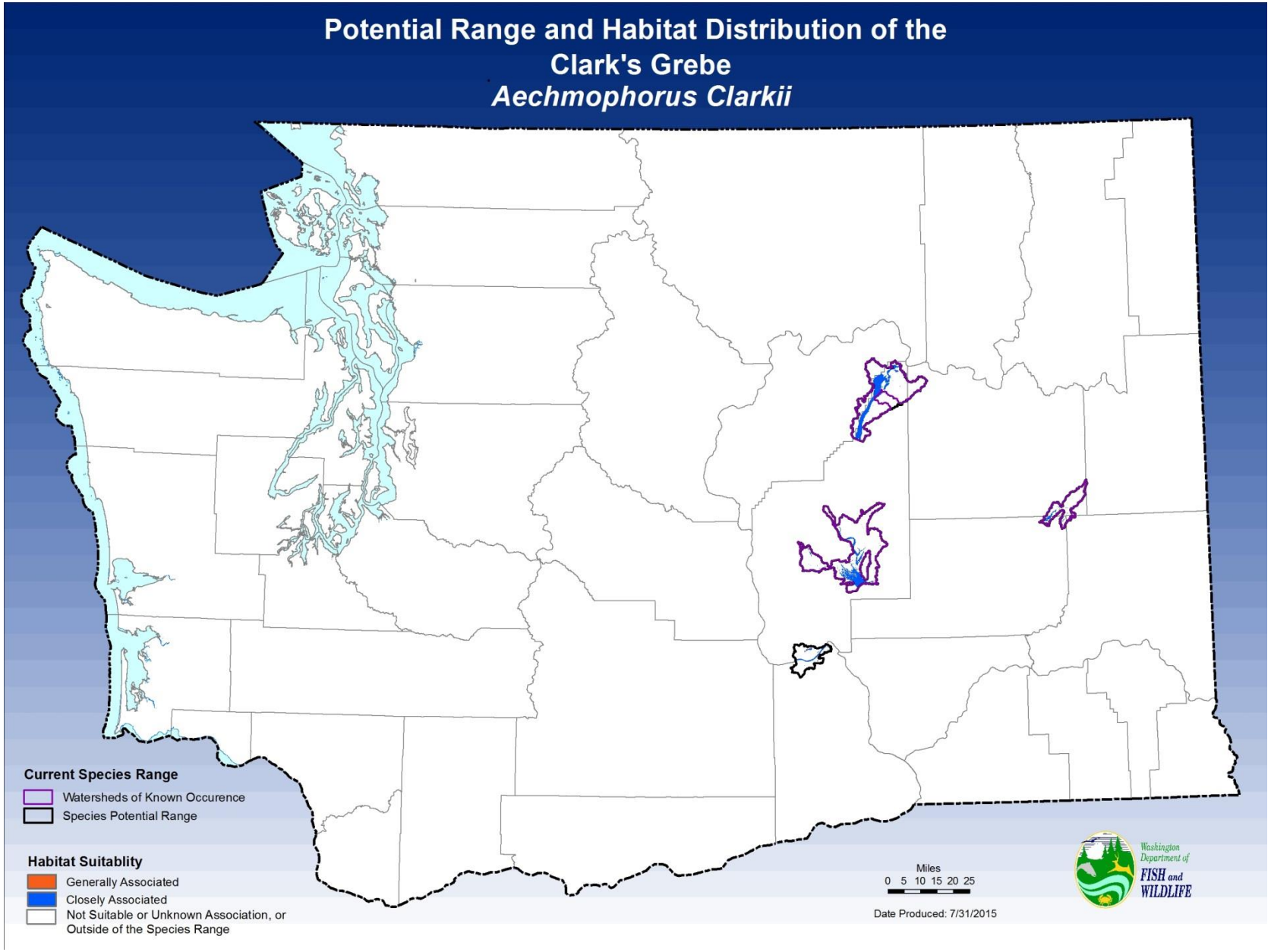
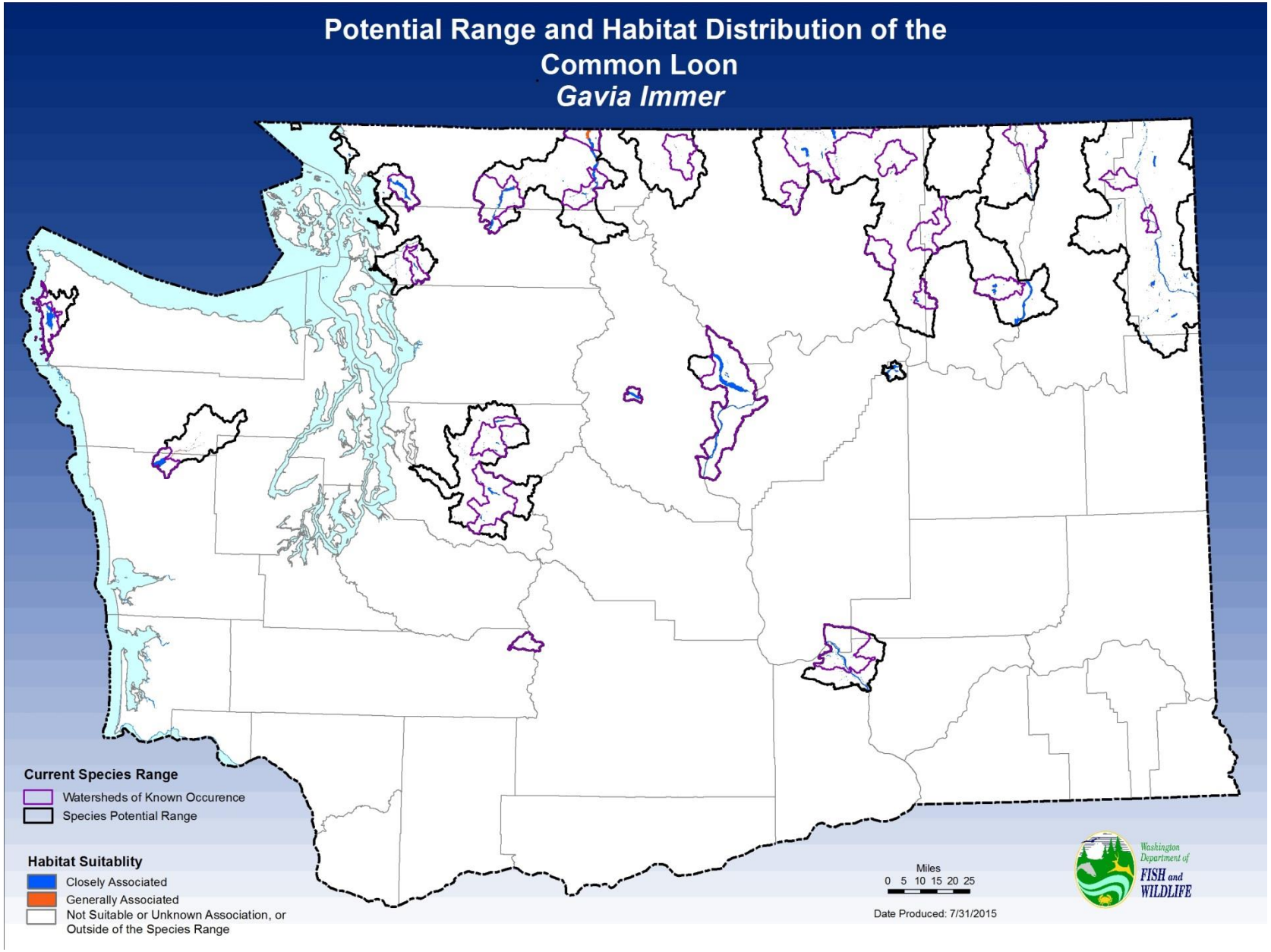
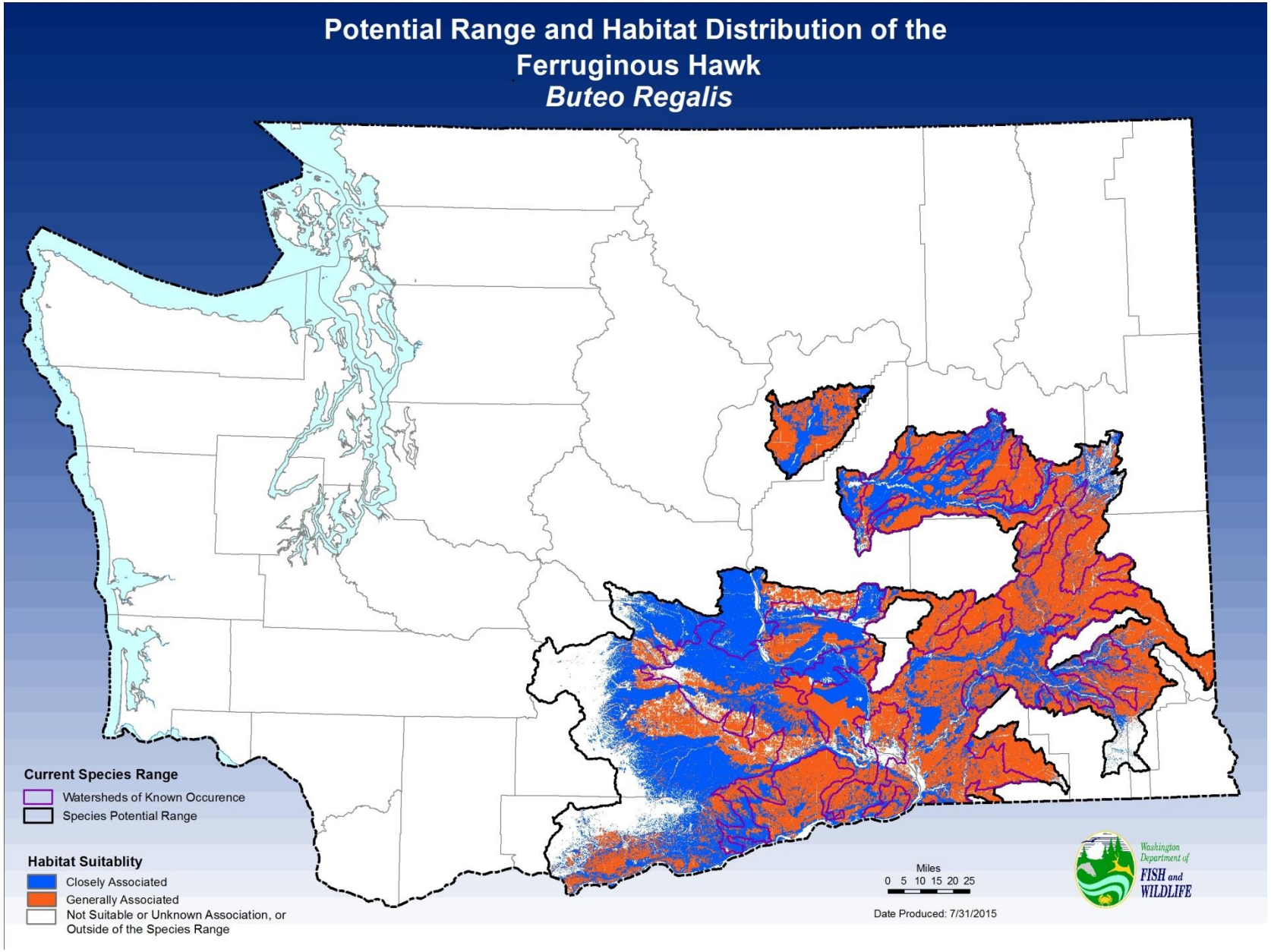
Clark's Grebe



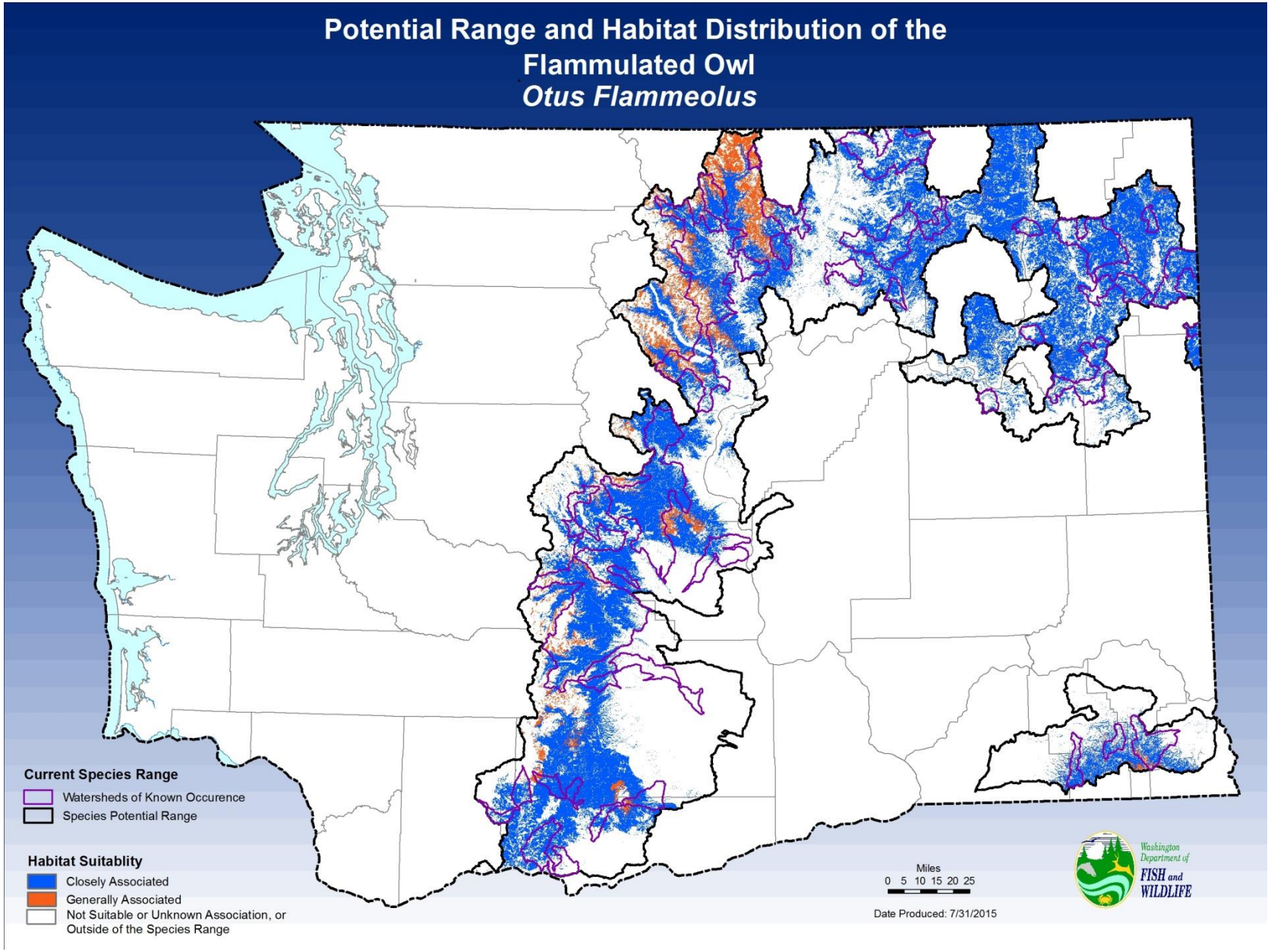
Common Loon


Potential Range and Habitat Distribution of the
Common Loon
Gavia Immer
Current Species Range
Watersheds of Known Occurence
Species Potential Range
Habitat Suitablity
Closely Associated
Generally Associated
Not Suitable or Unknown Association, or
Outside of the Species Range
Miles
0 5 10 15 20 25
Date Produced: 7/31/2015
Washington Department of
FISH and
WILDLIFE

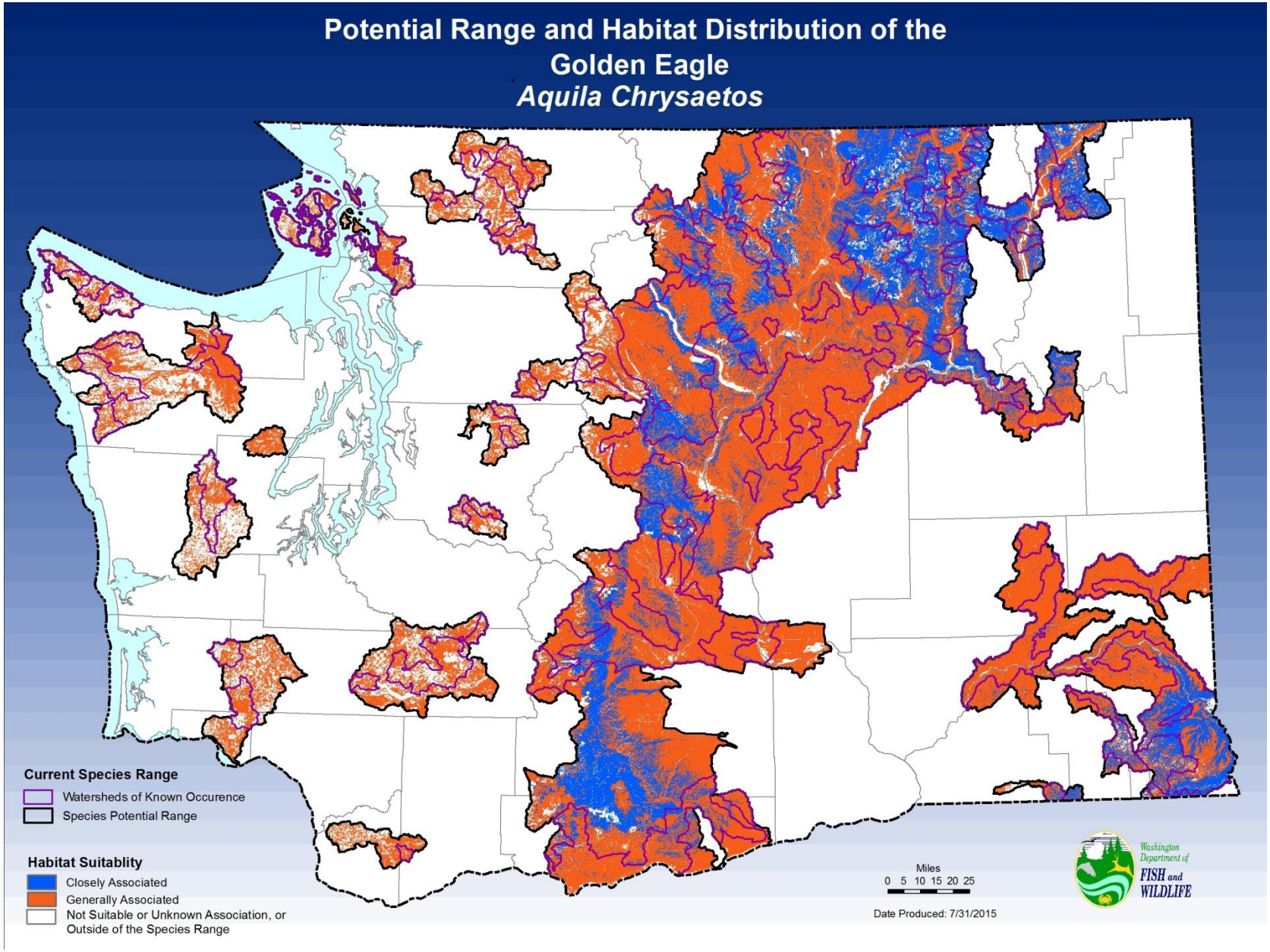
Ferruginous Hawk



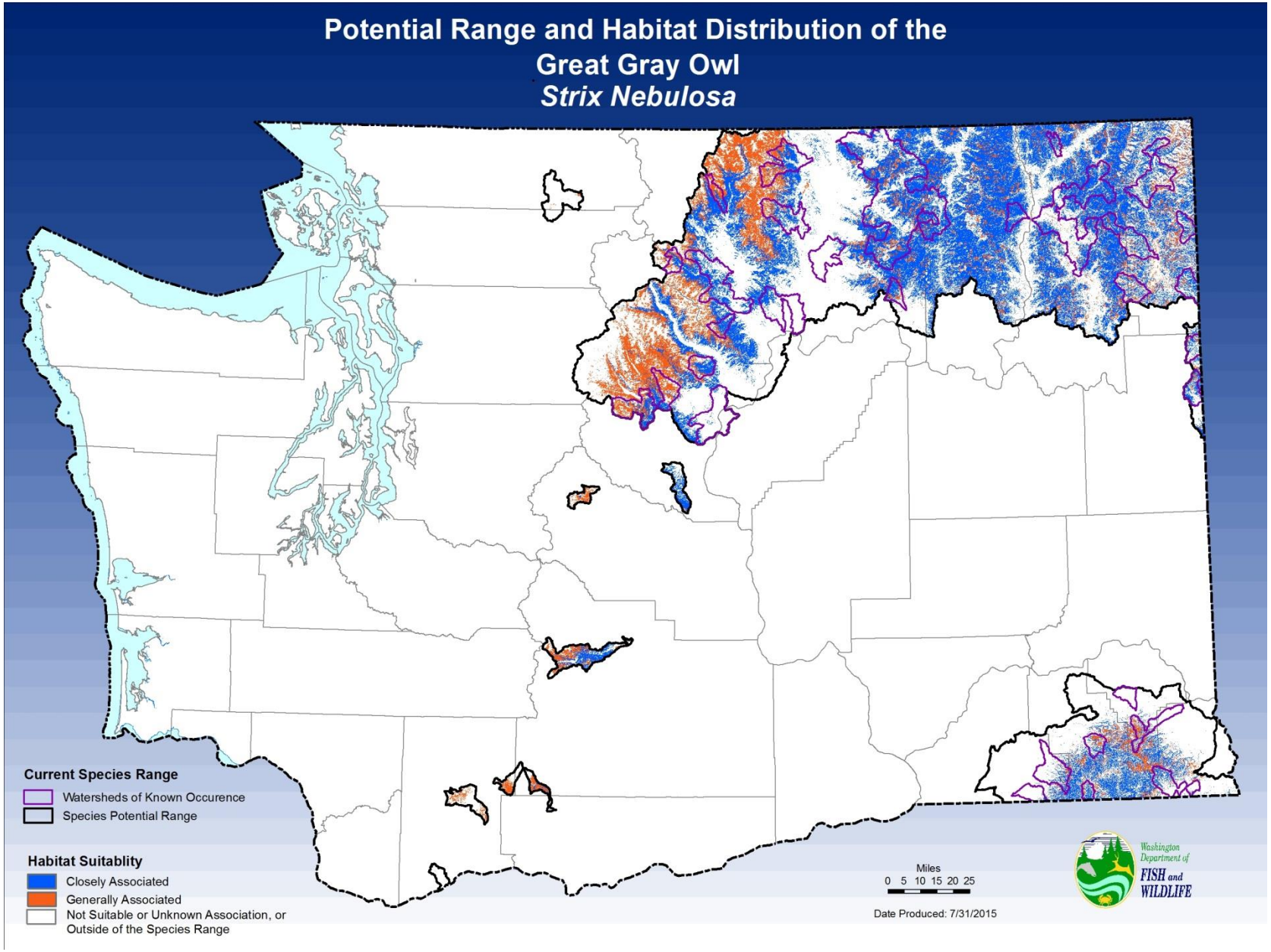
Flammulated Owl



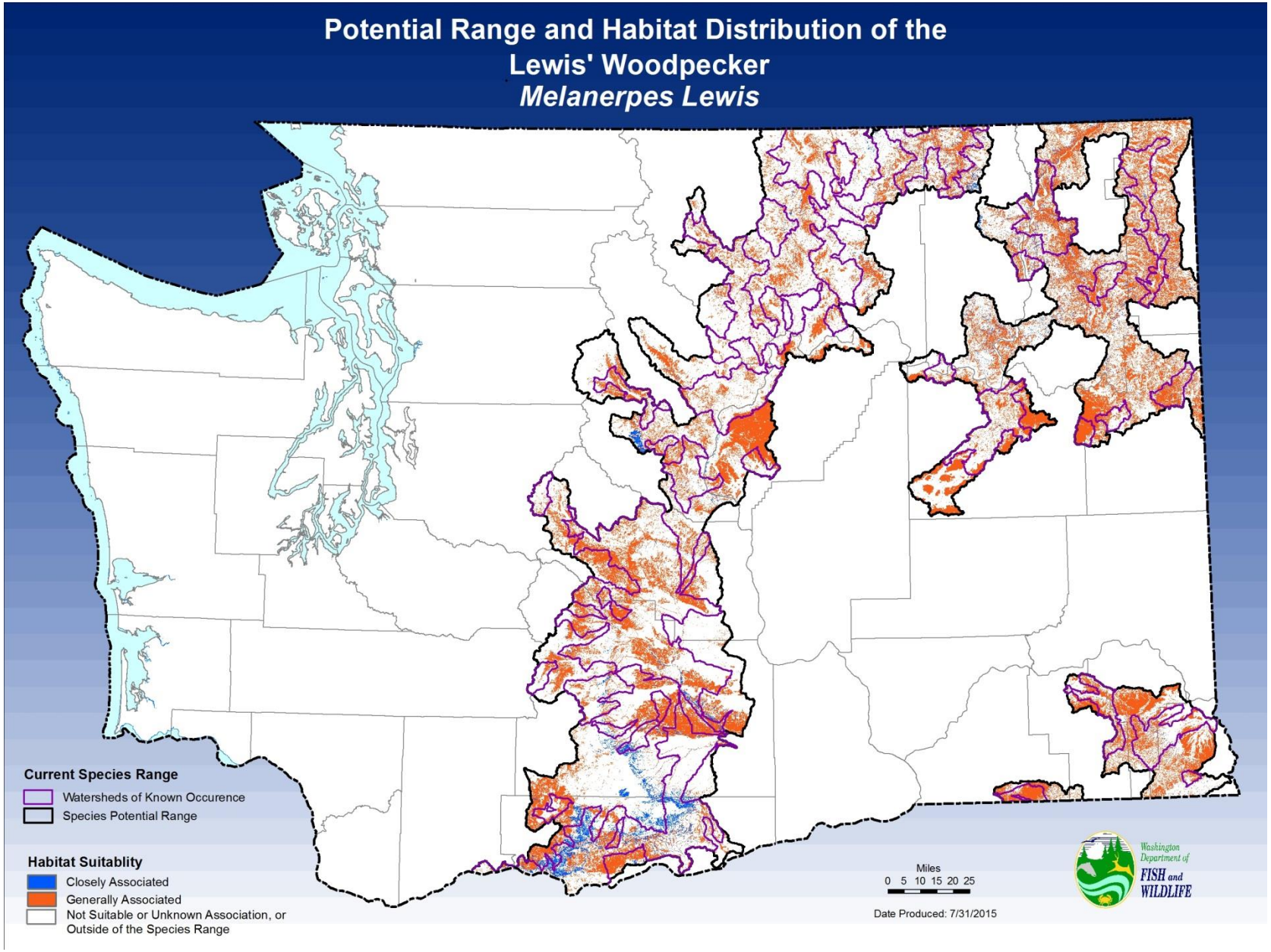
Golden Eagle



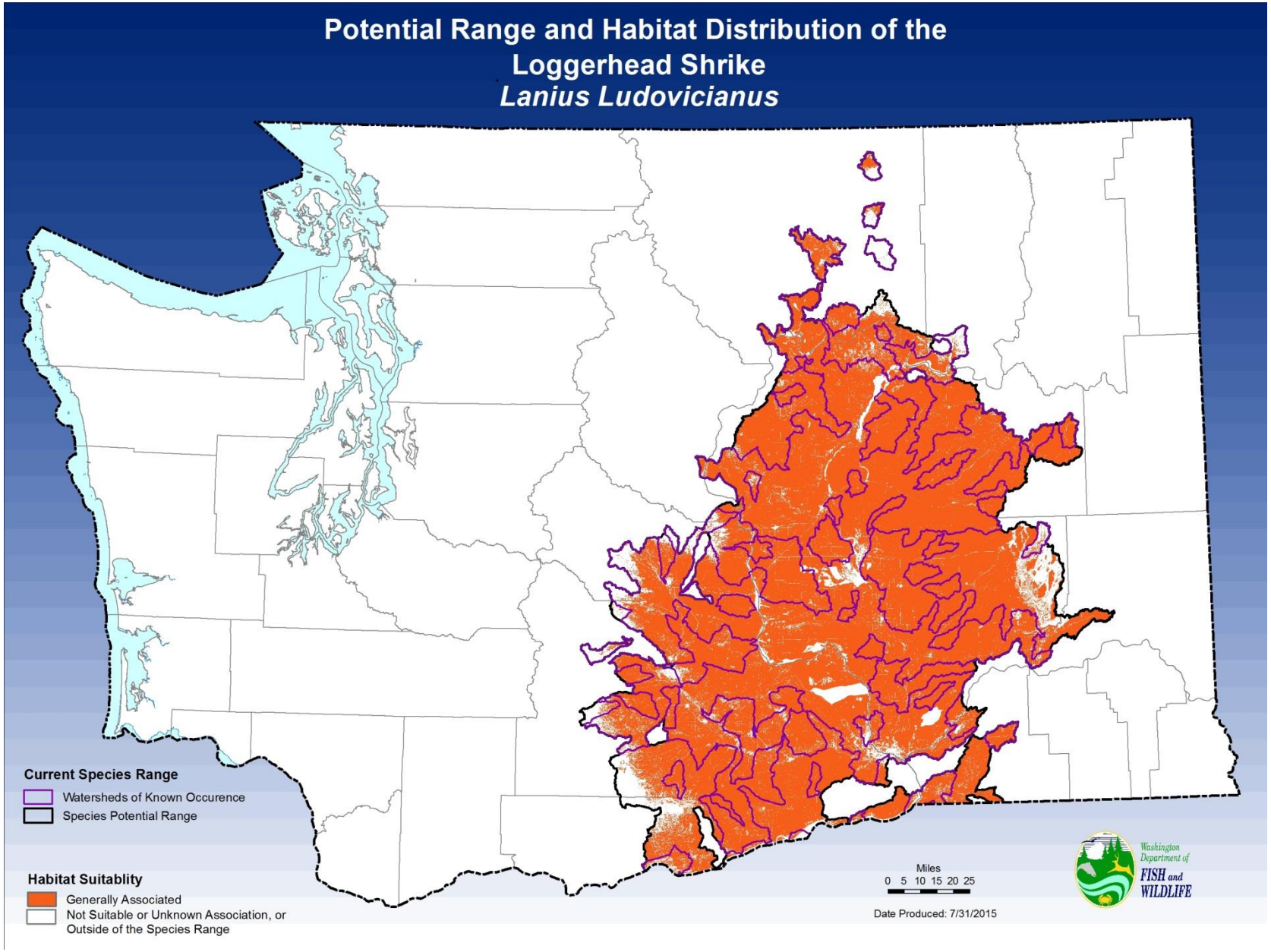
Great Gray Owl



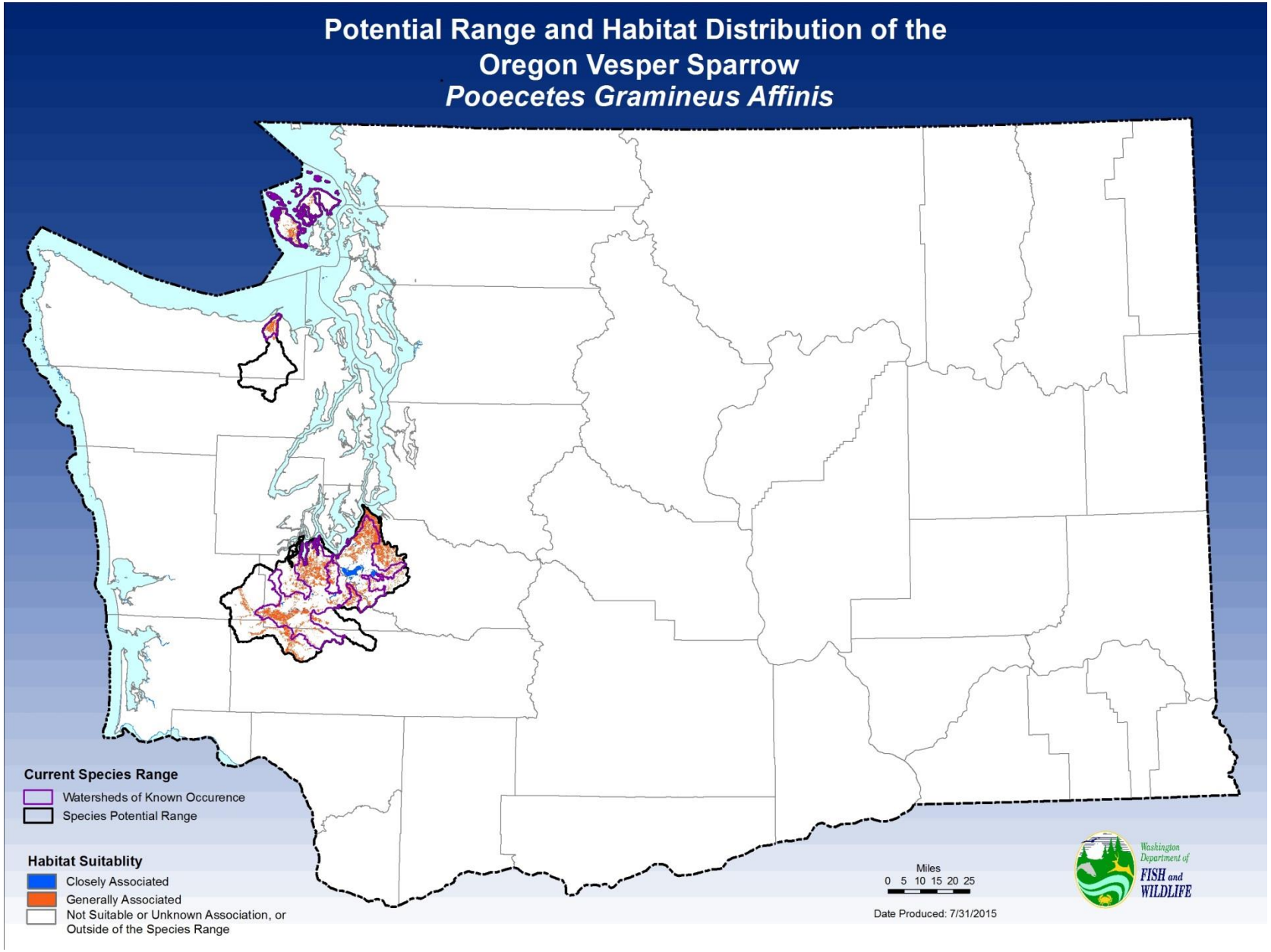
Lewis' Woodpecker



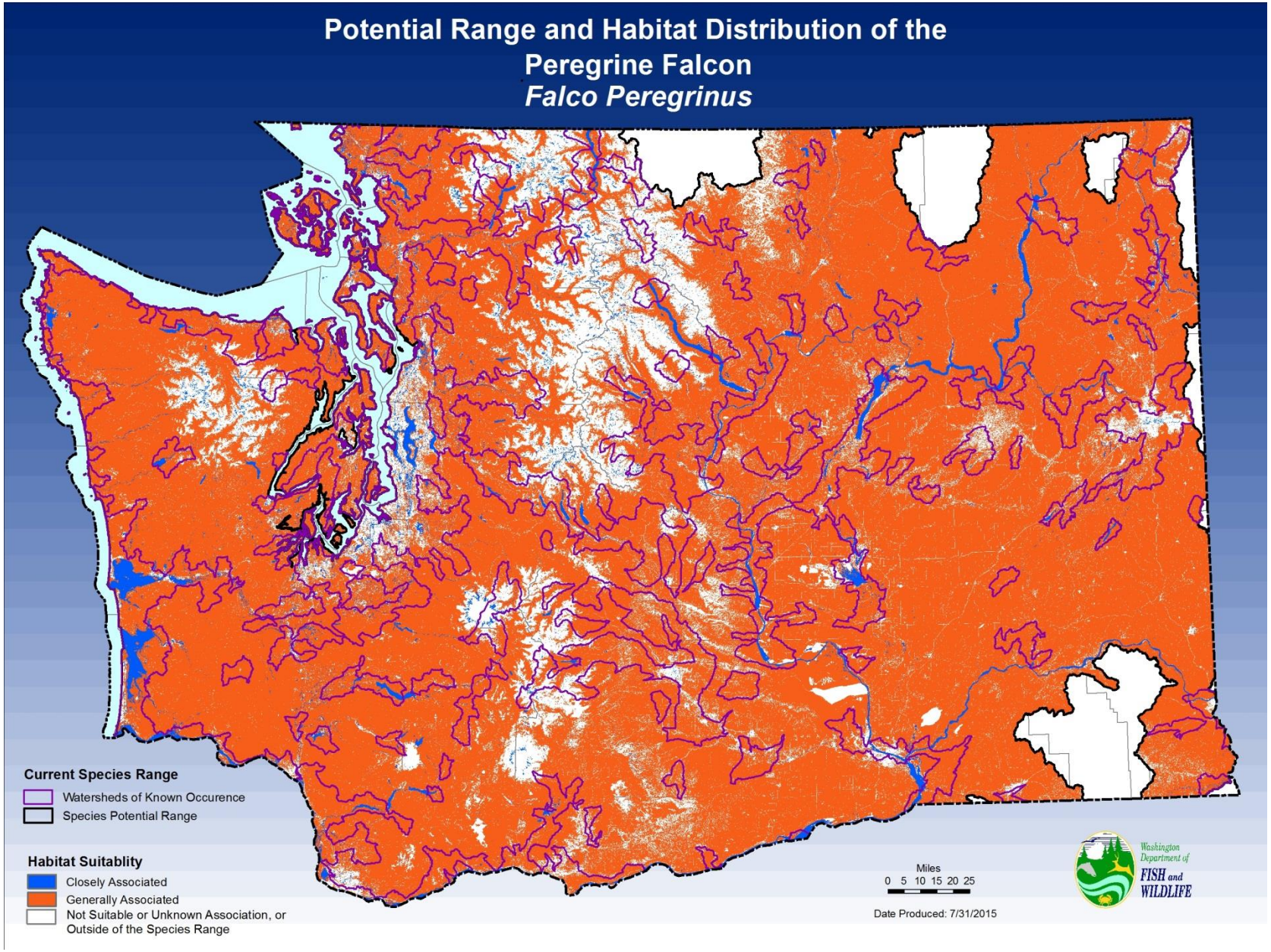
Loggerhead Shrike



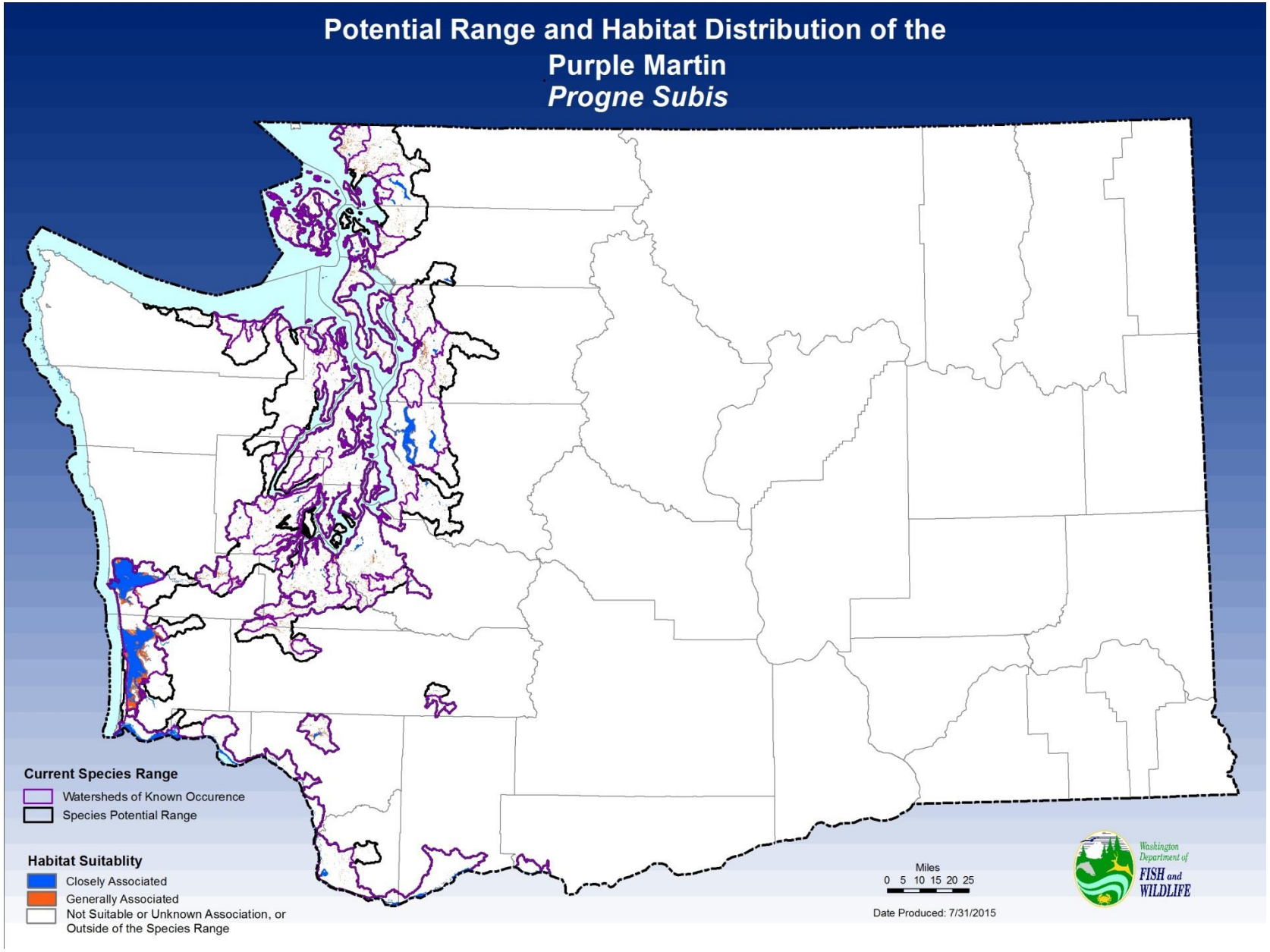
Oregon Vesper Sparrow



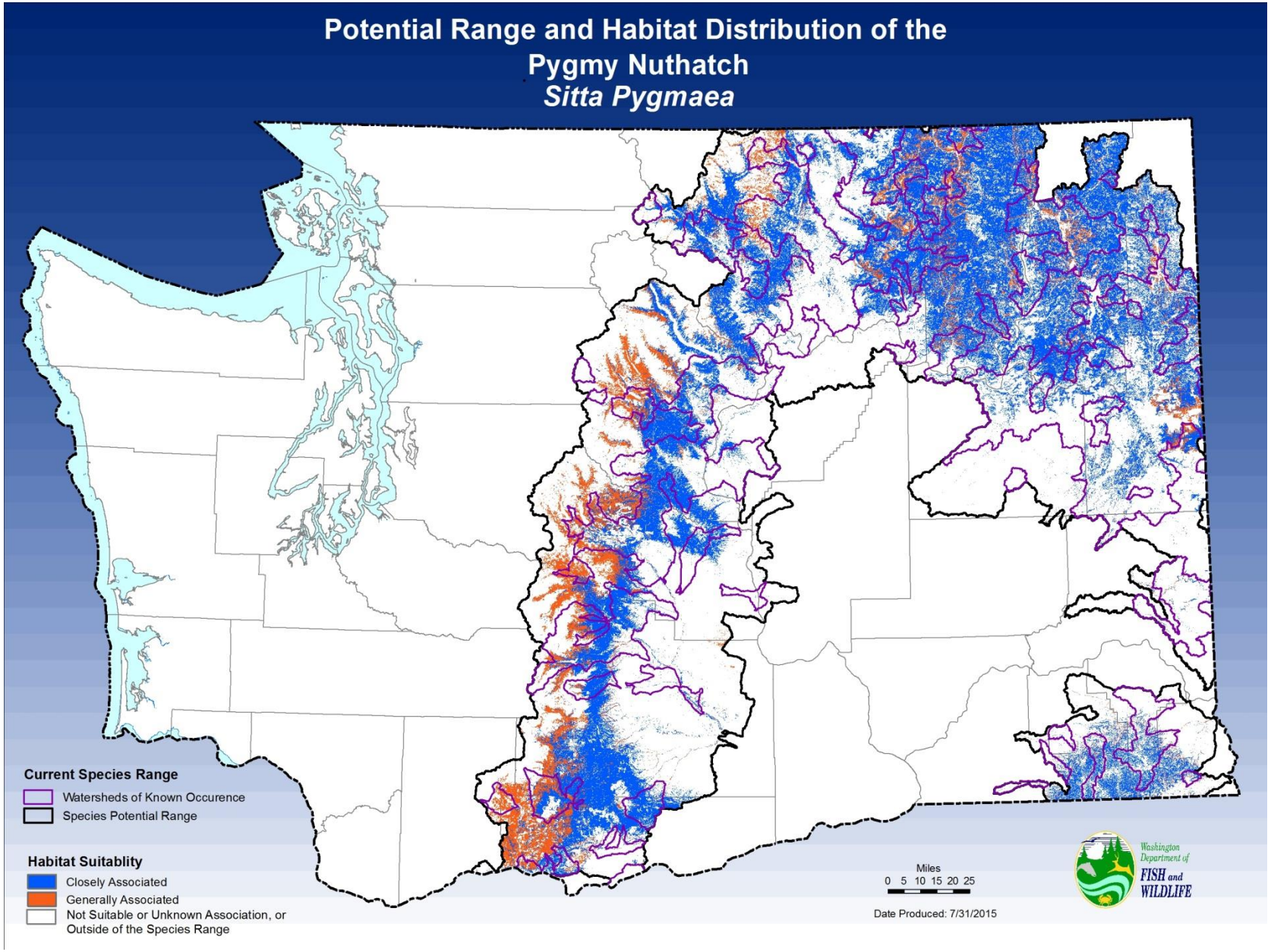
Peregrine Falcon



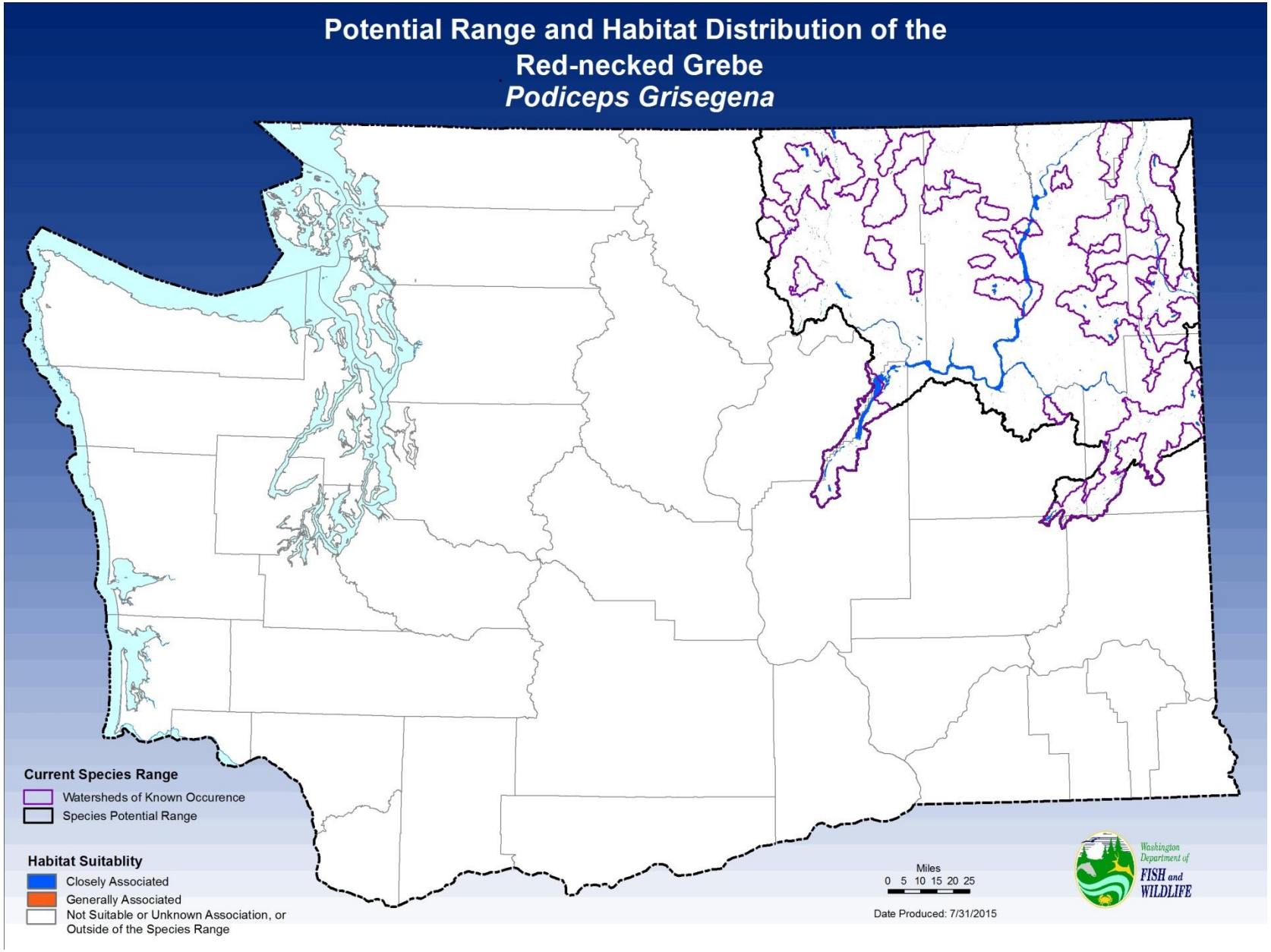
Purple Martin



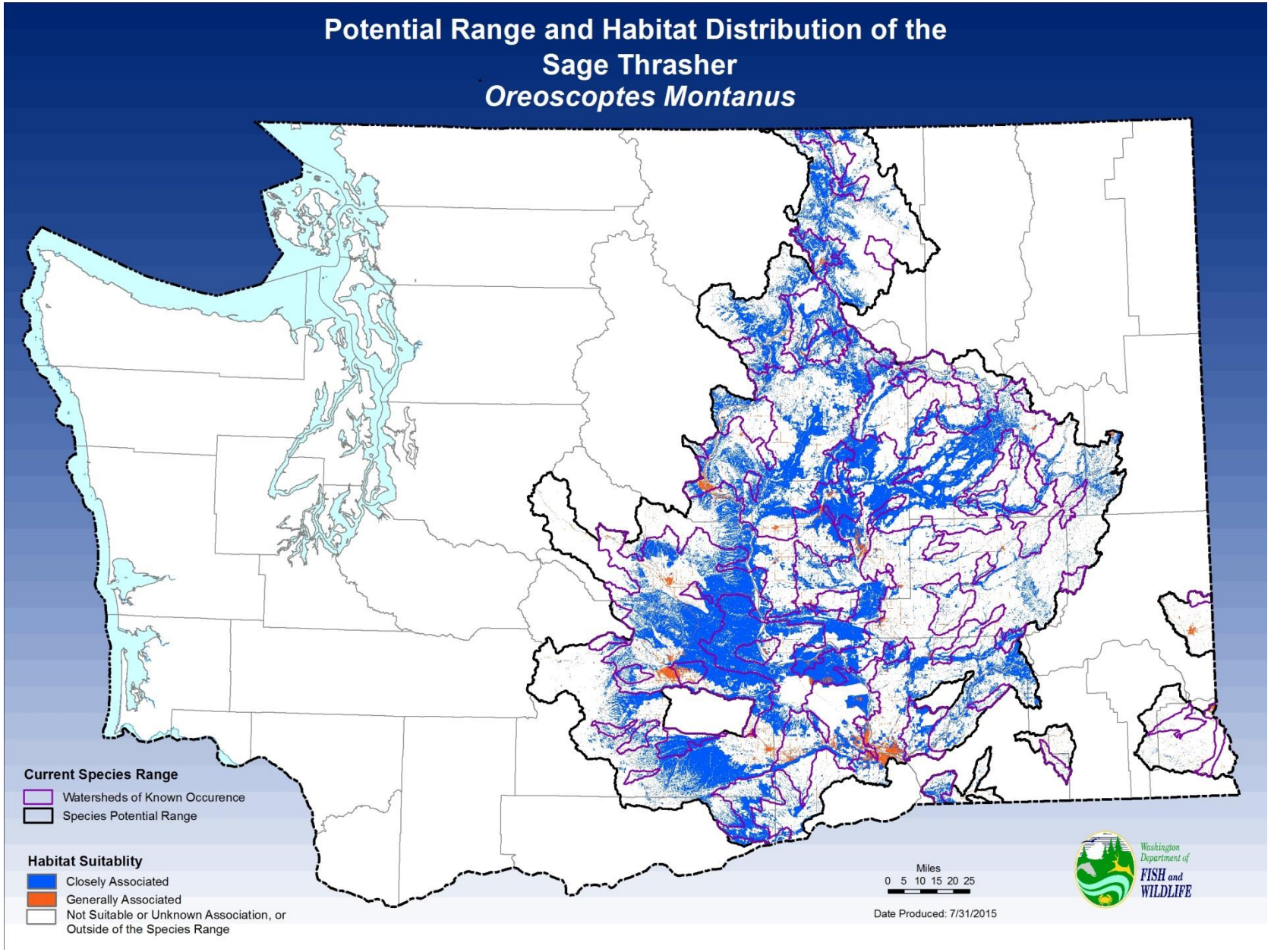
Pygmy Nuthatch



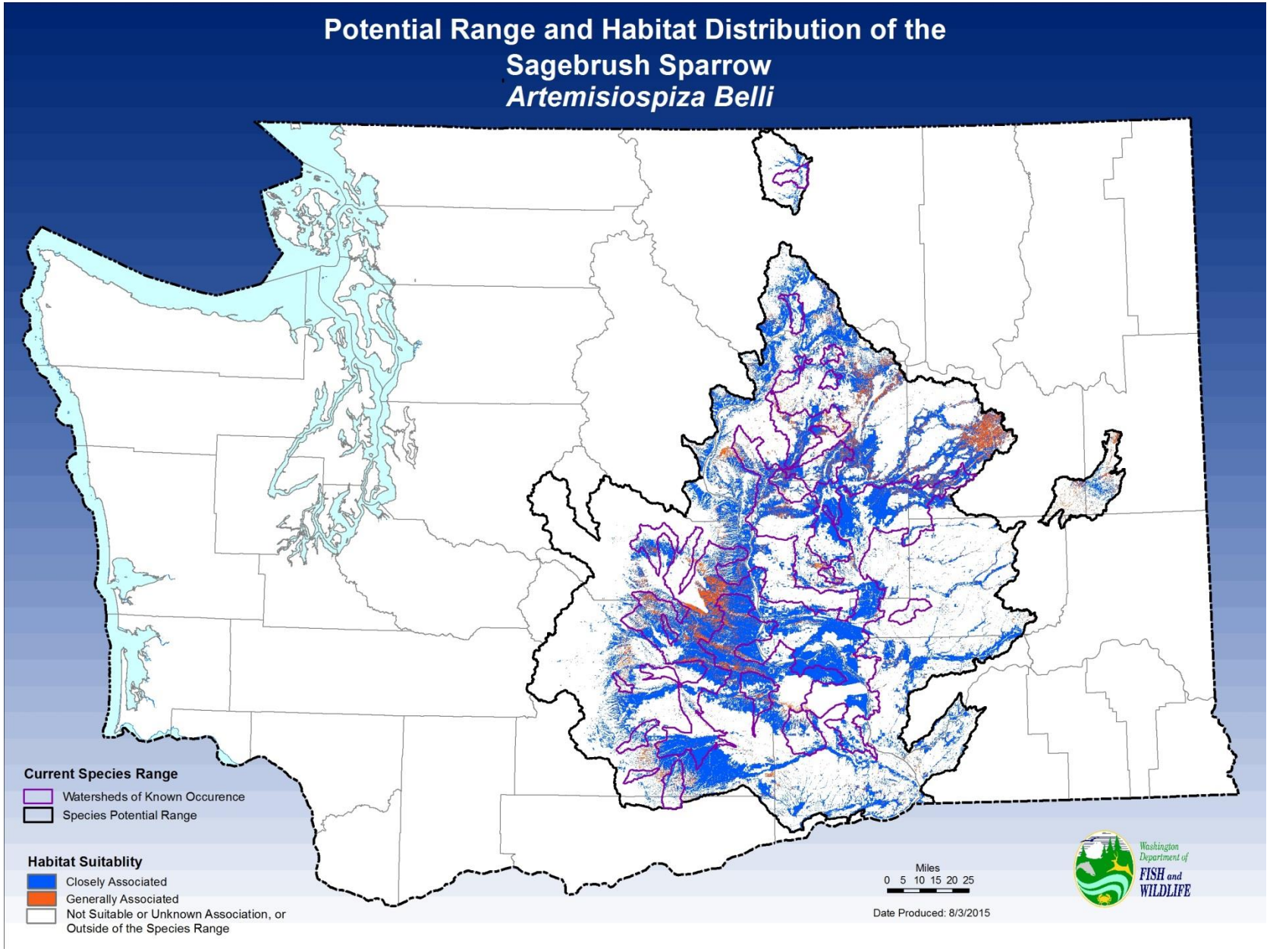
Red-necked Grebe



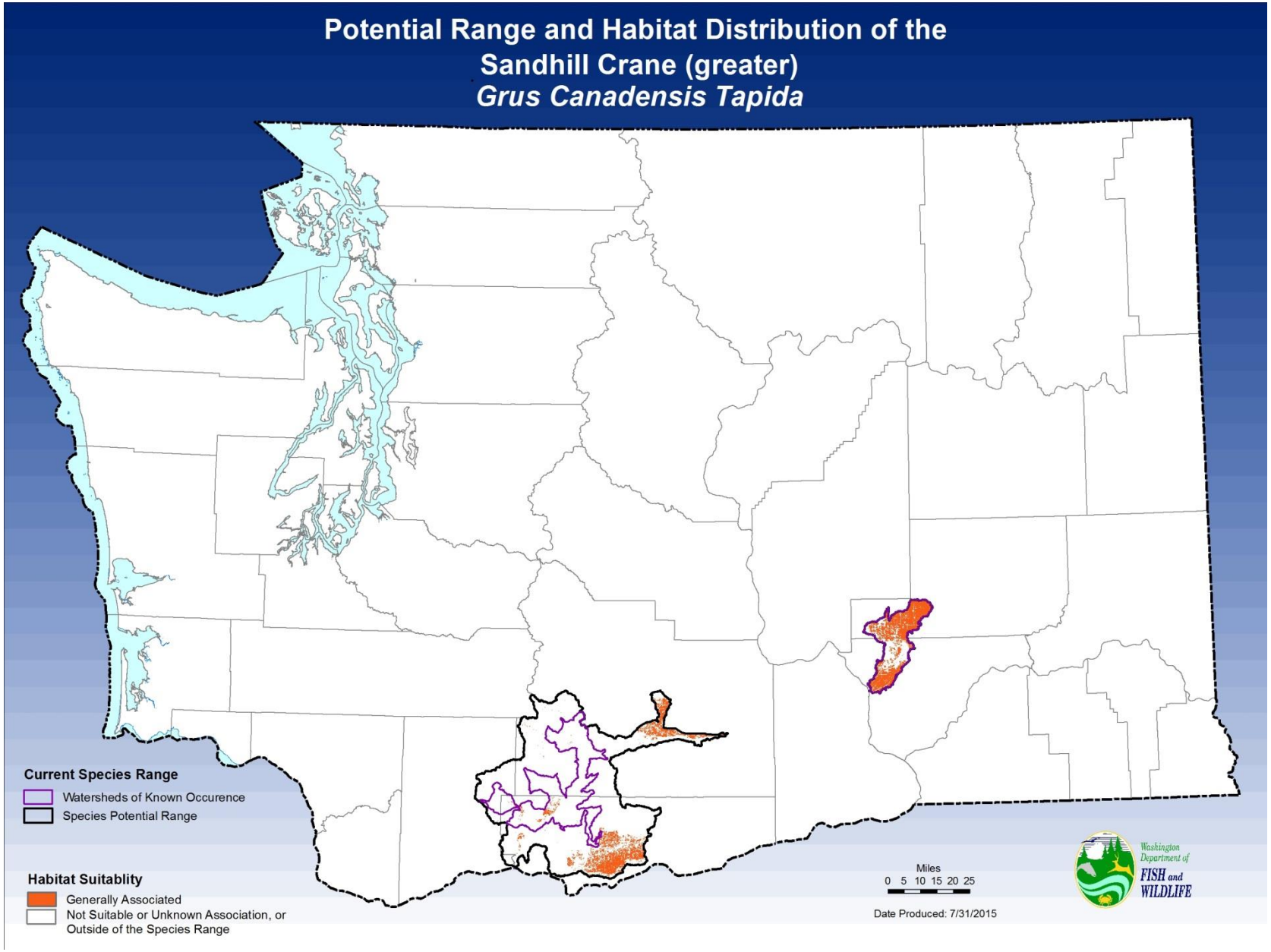
Sage Thrasher



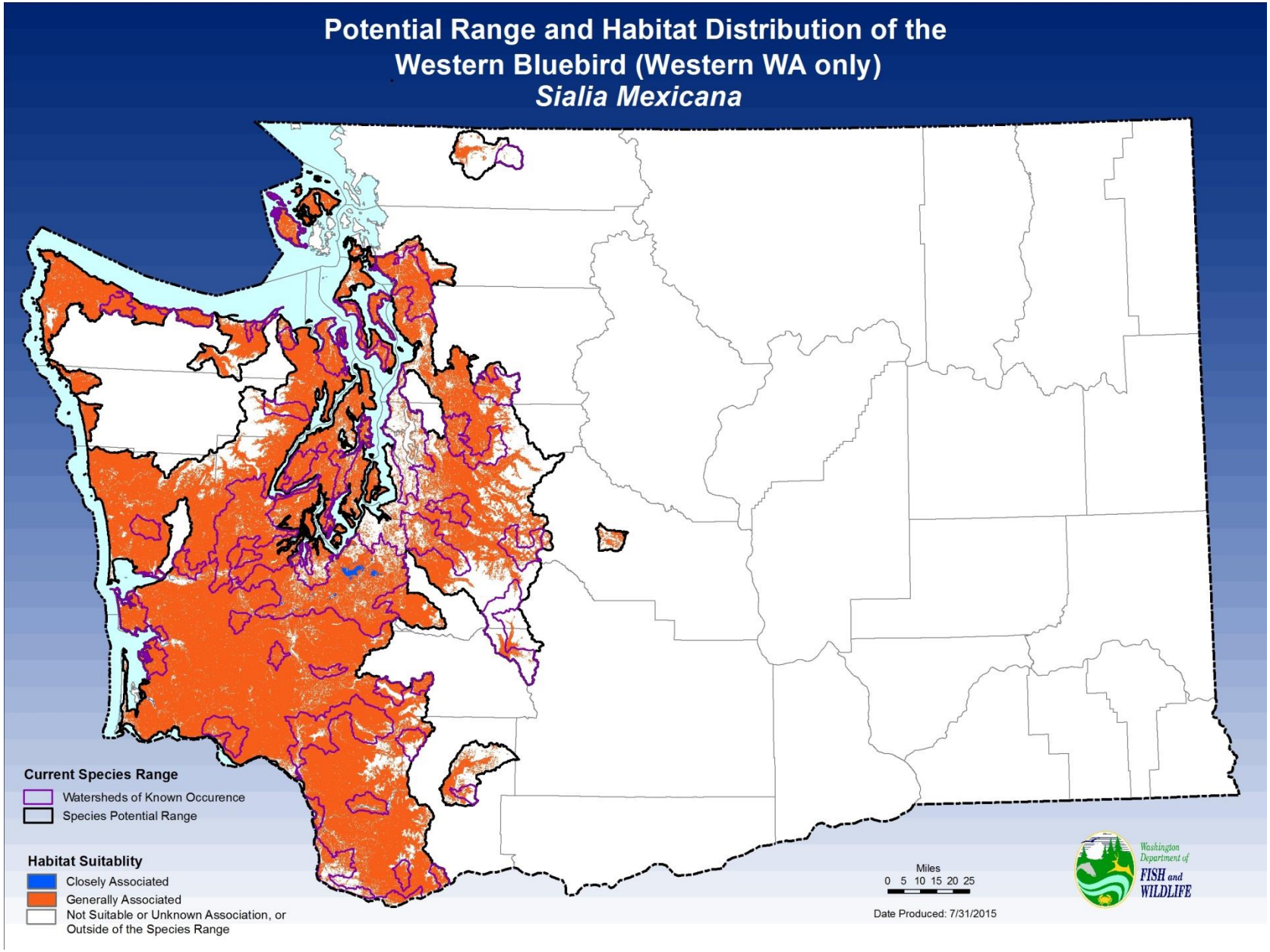
Sagebrush Sparrow



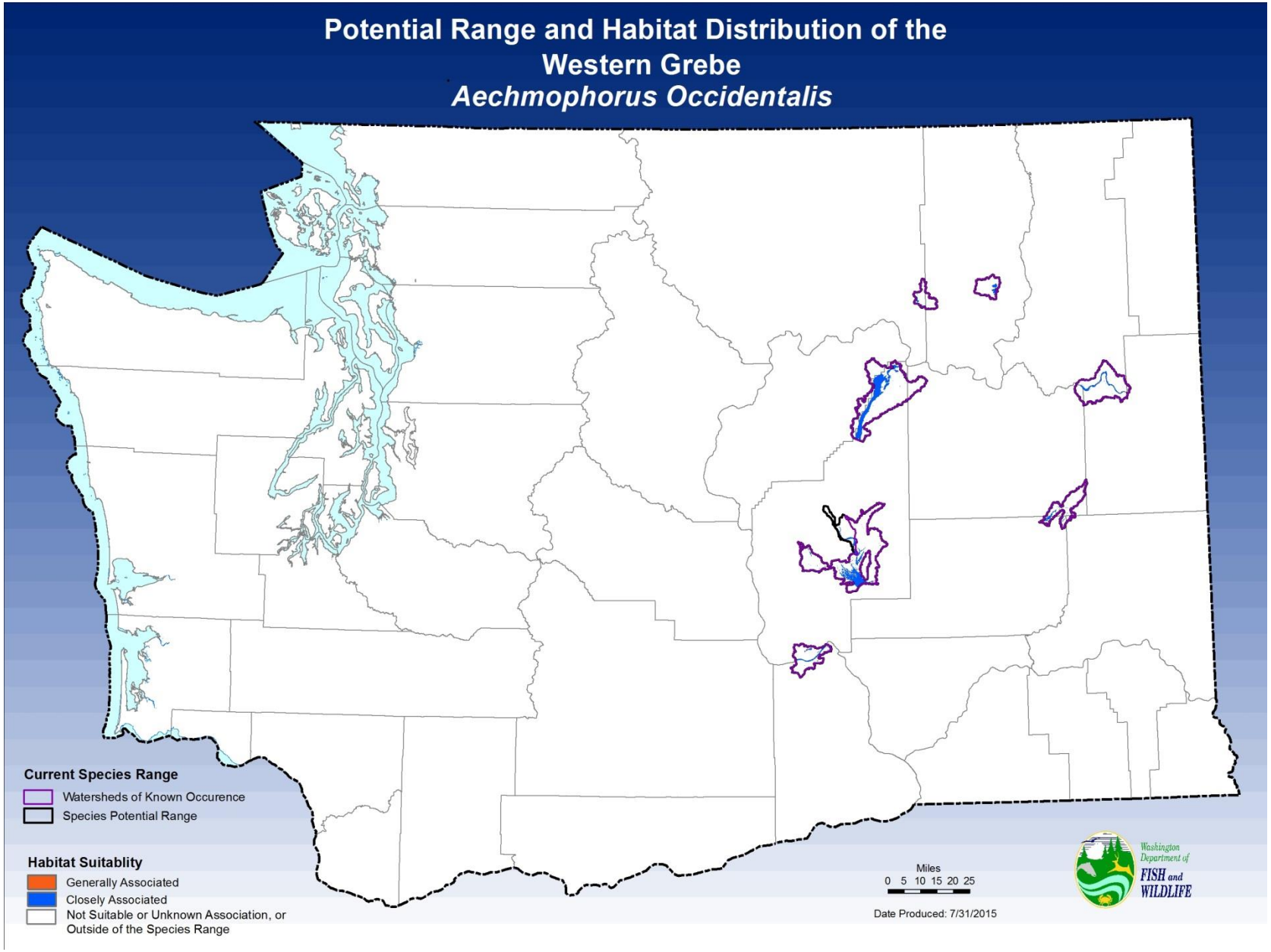
Sandhill Crane (greater)



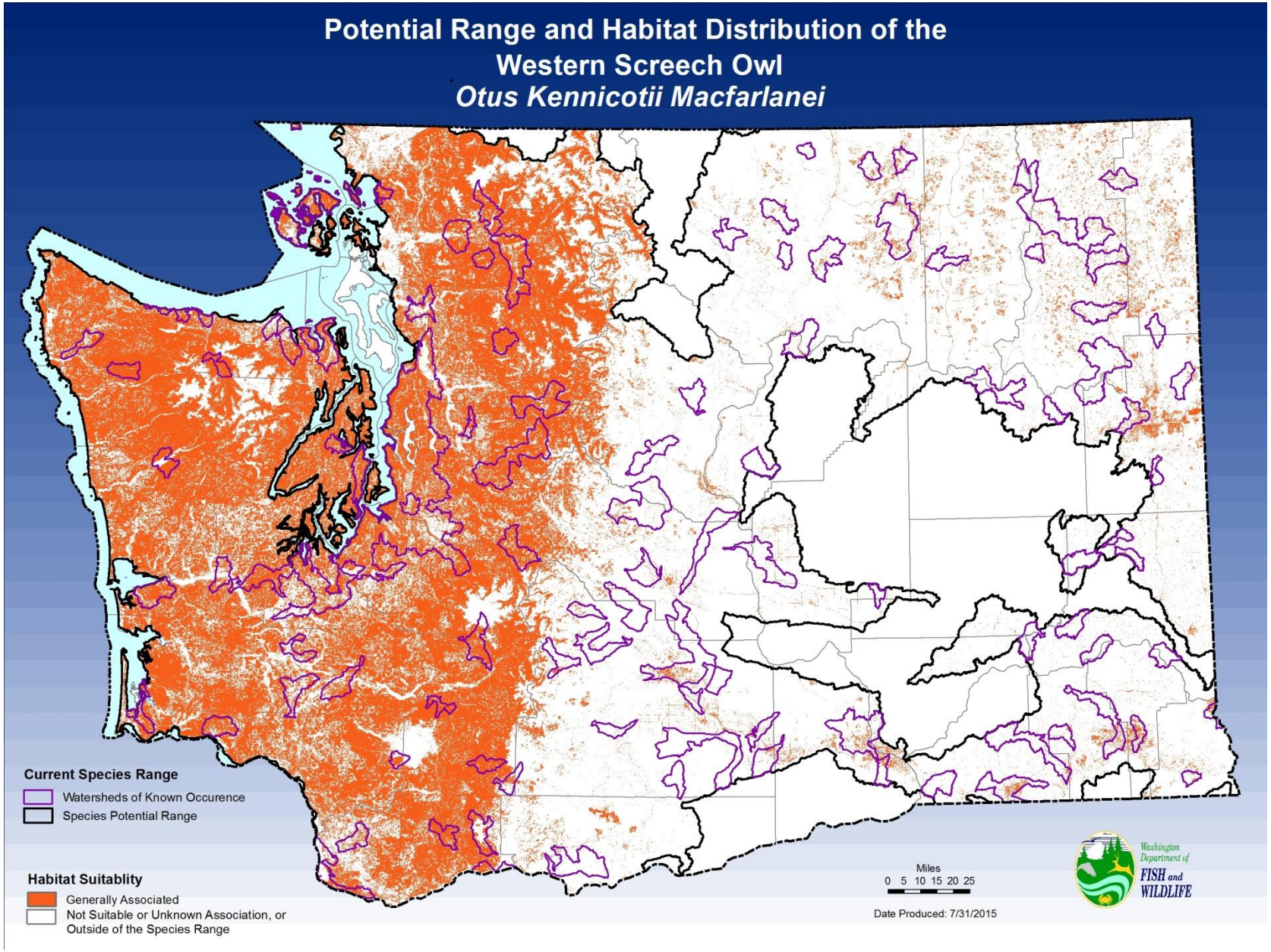
Western Bluebird *(Western Washington only)*



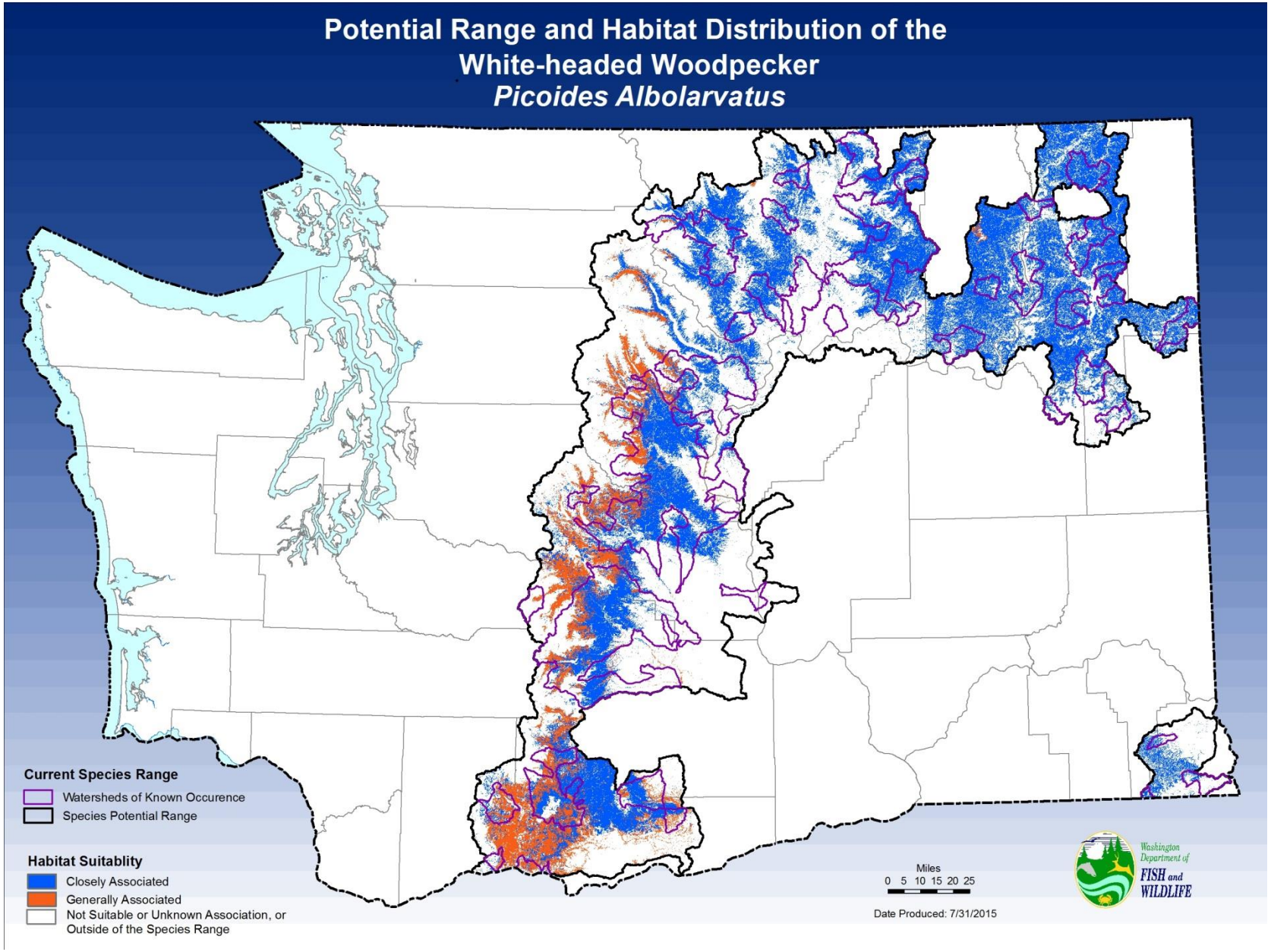
Western Grebe



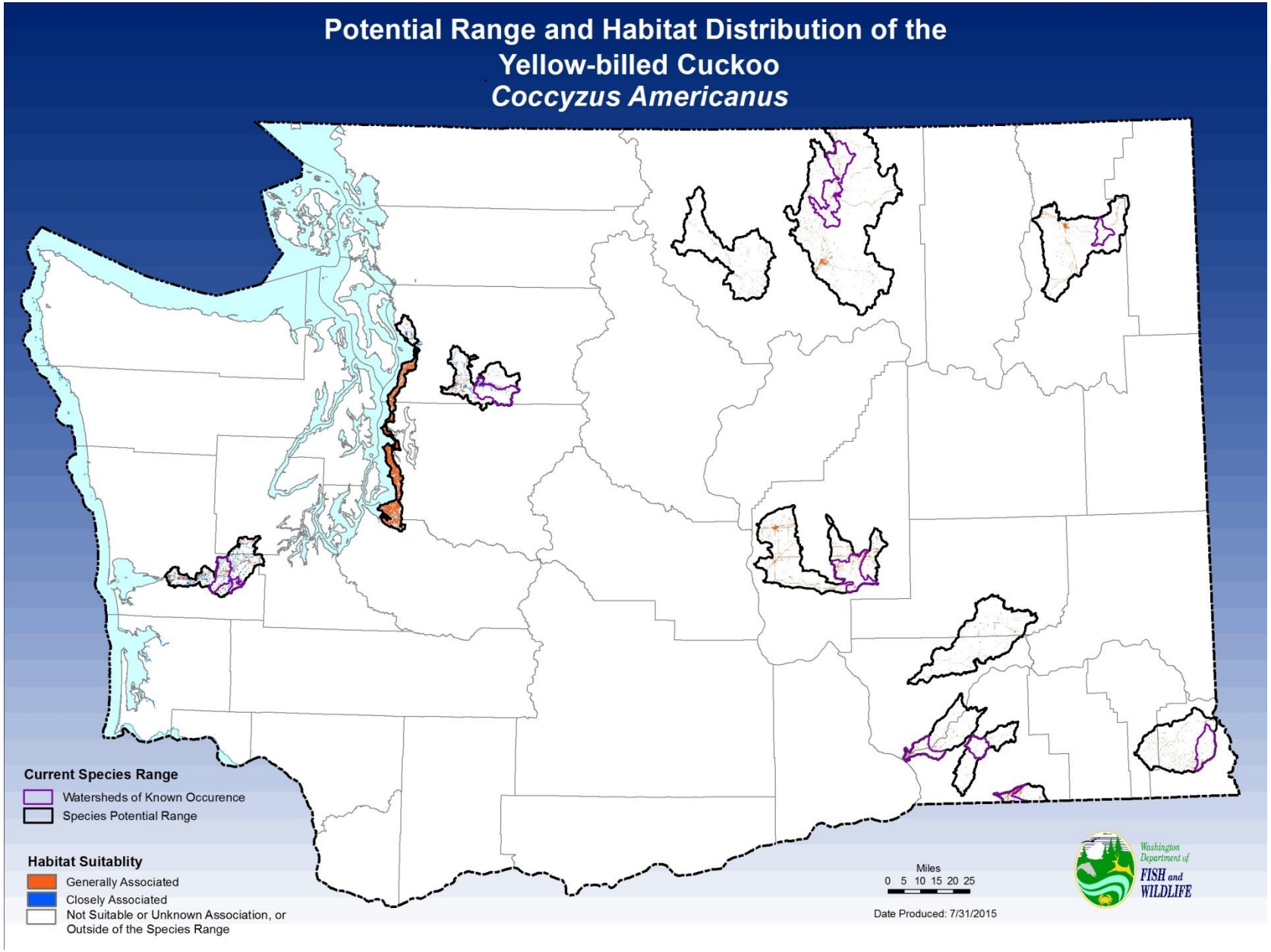
Western Screech Owl



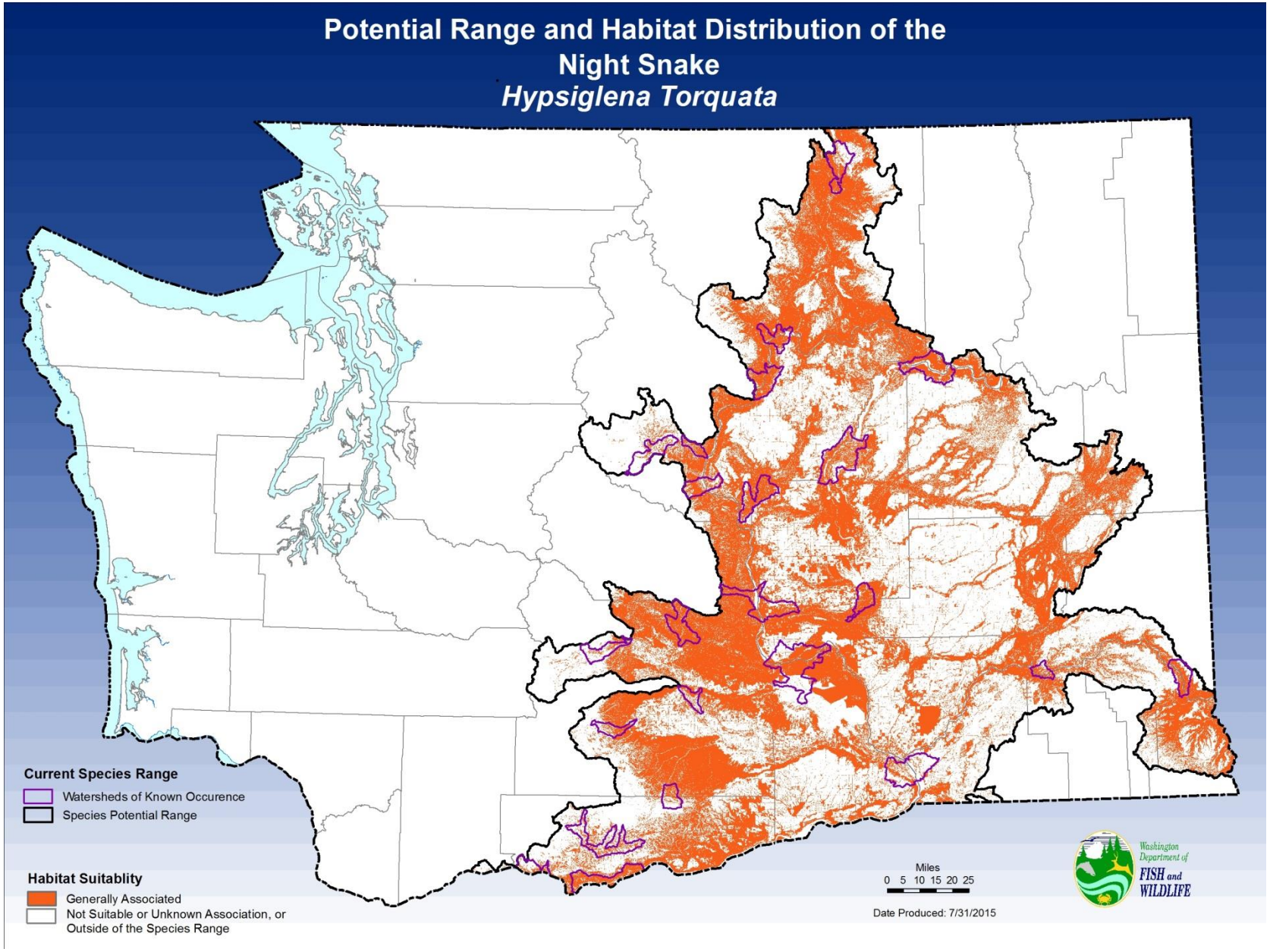
White-headed Woodpecker



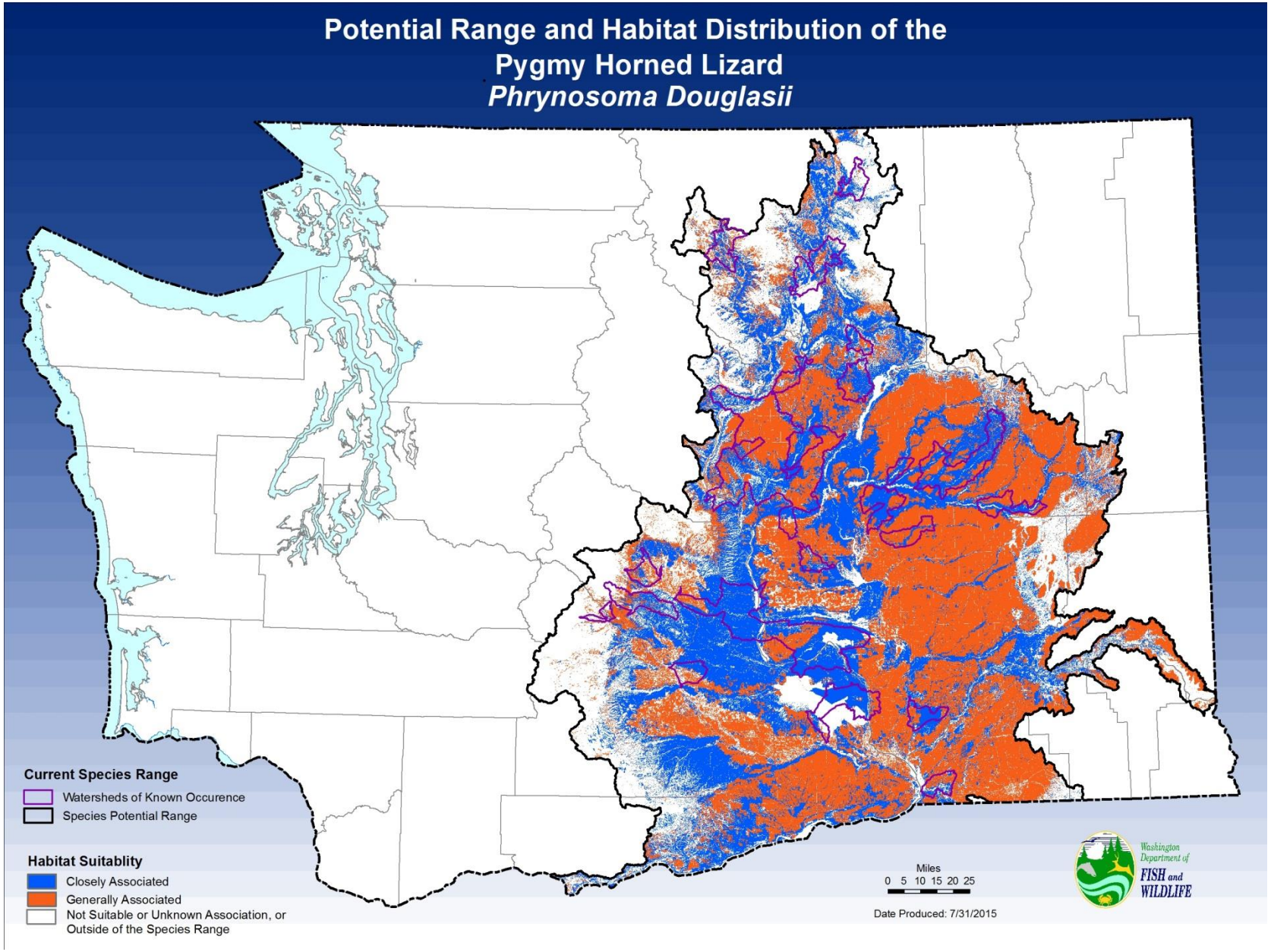
Yellow-billed Cuckoo



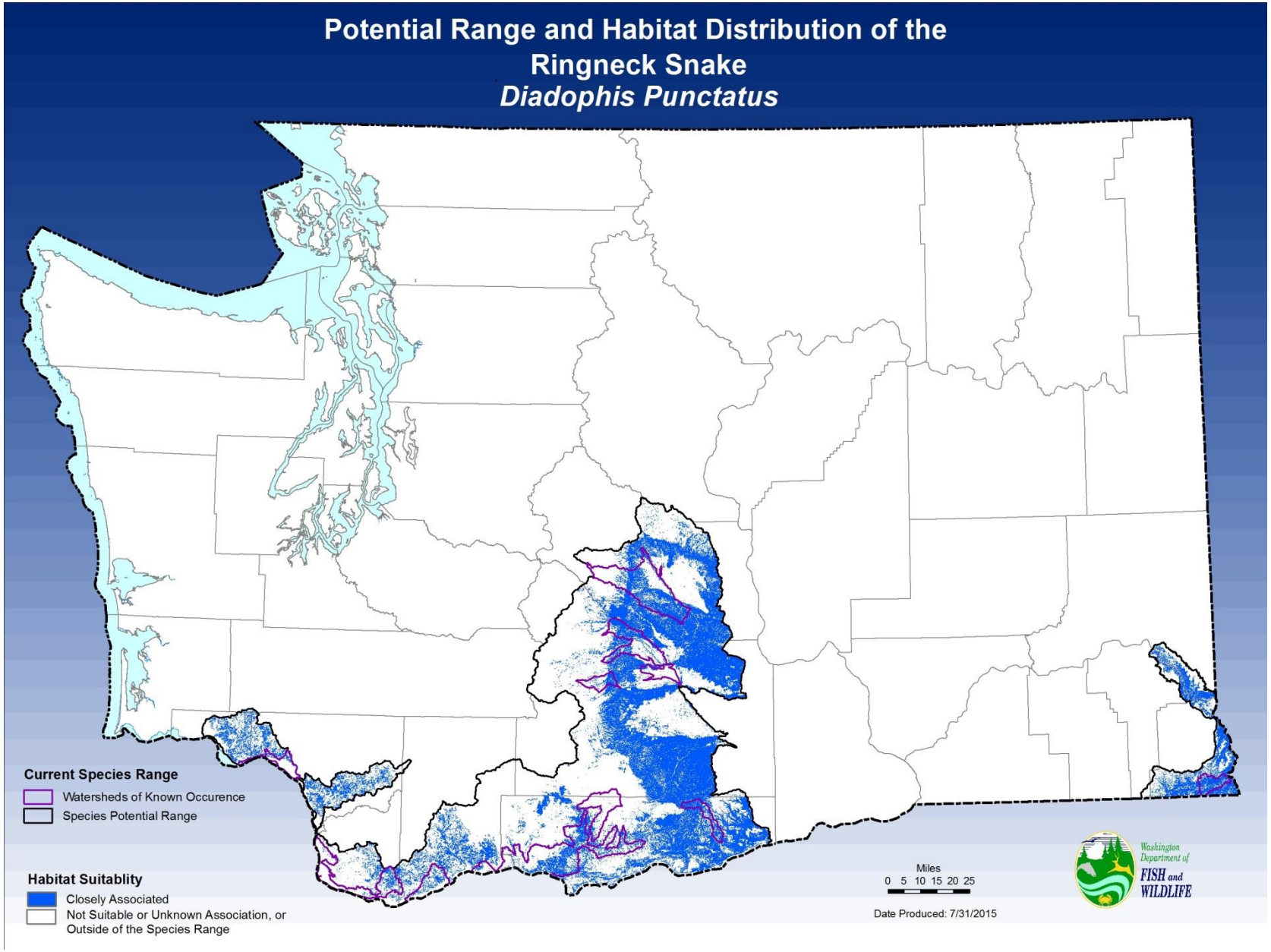
Night Snake


Potential Range and Habitat Distribution of the
Night Snake
Hypsiglena Torquata
Current Species Range
Watersheds of Known Occurence
Species Potential Range
Habitat Suitablity
Generally Associated
Not Suitable or Unknown Association, or
Outside of the Species Range
Miles
0 5 10 15 20 25
Date Produced: 7/31/2015
Washington Department of
FISH and
WILDLIFE

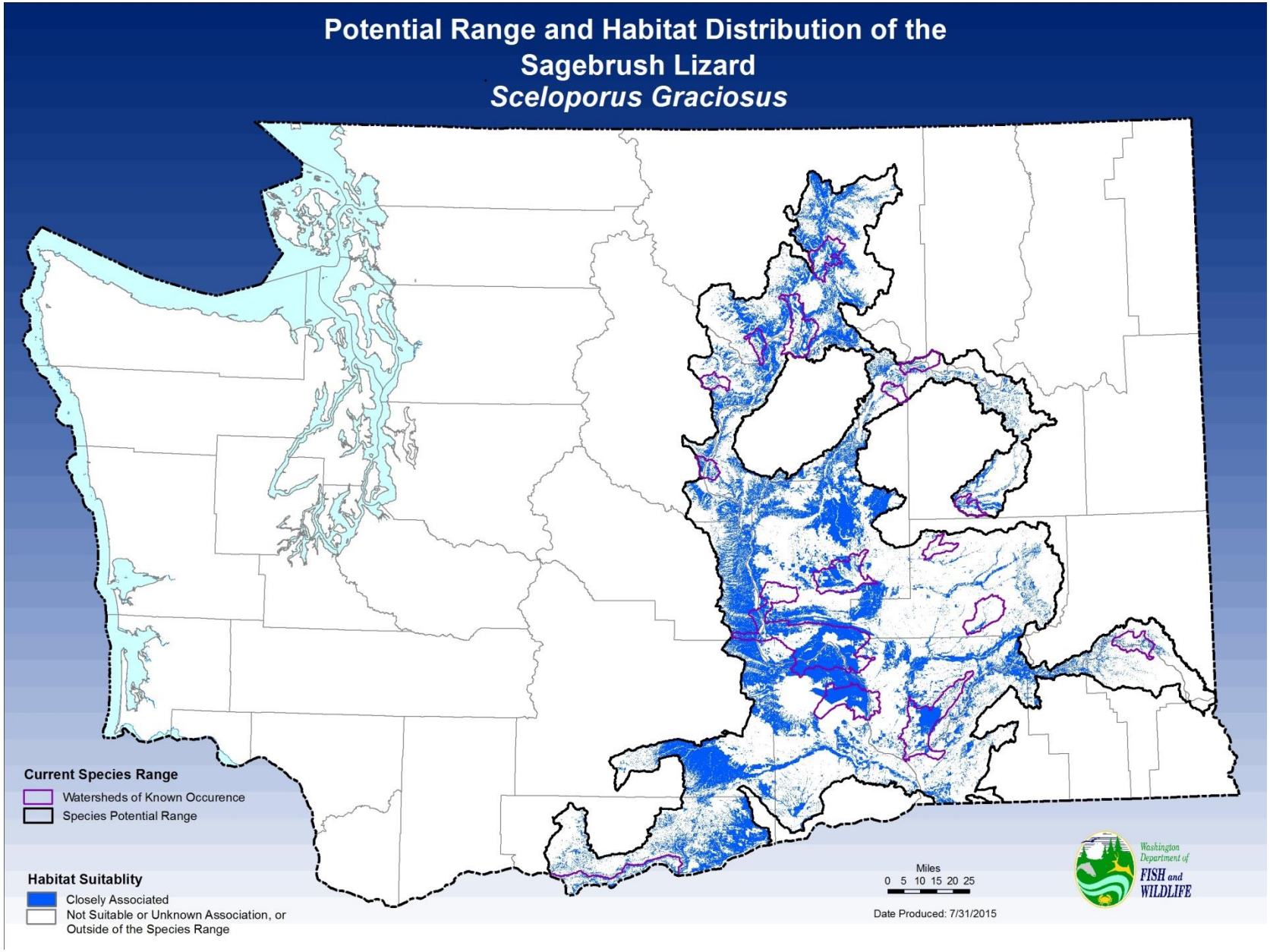
Pygmy Horned Lizard



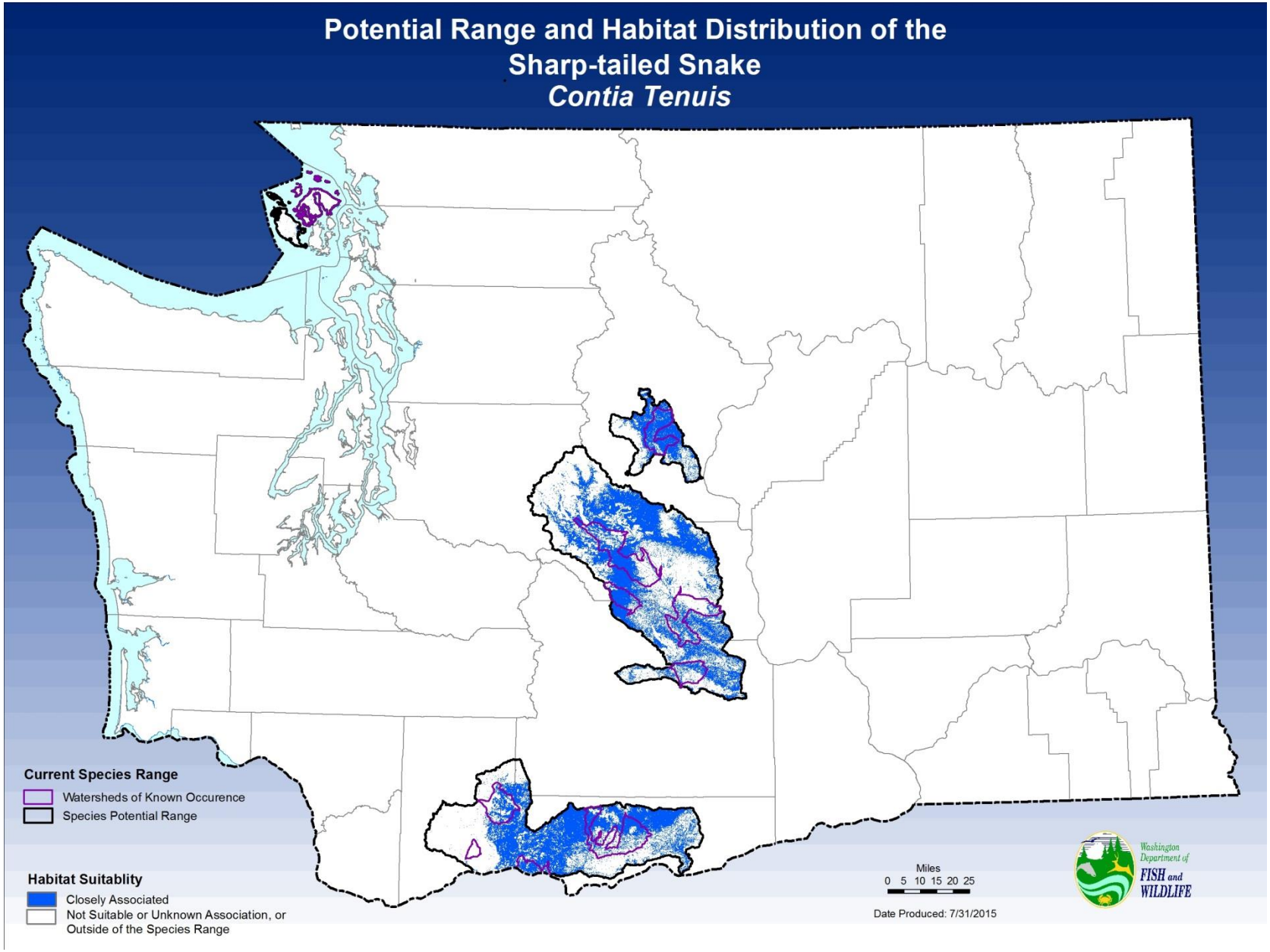
Ringneck Snake



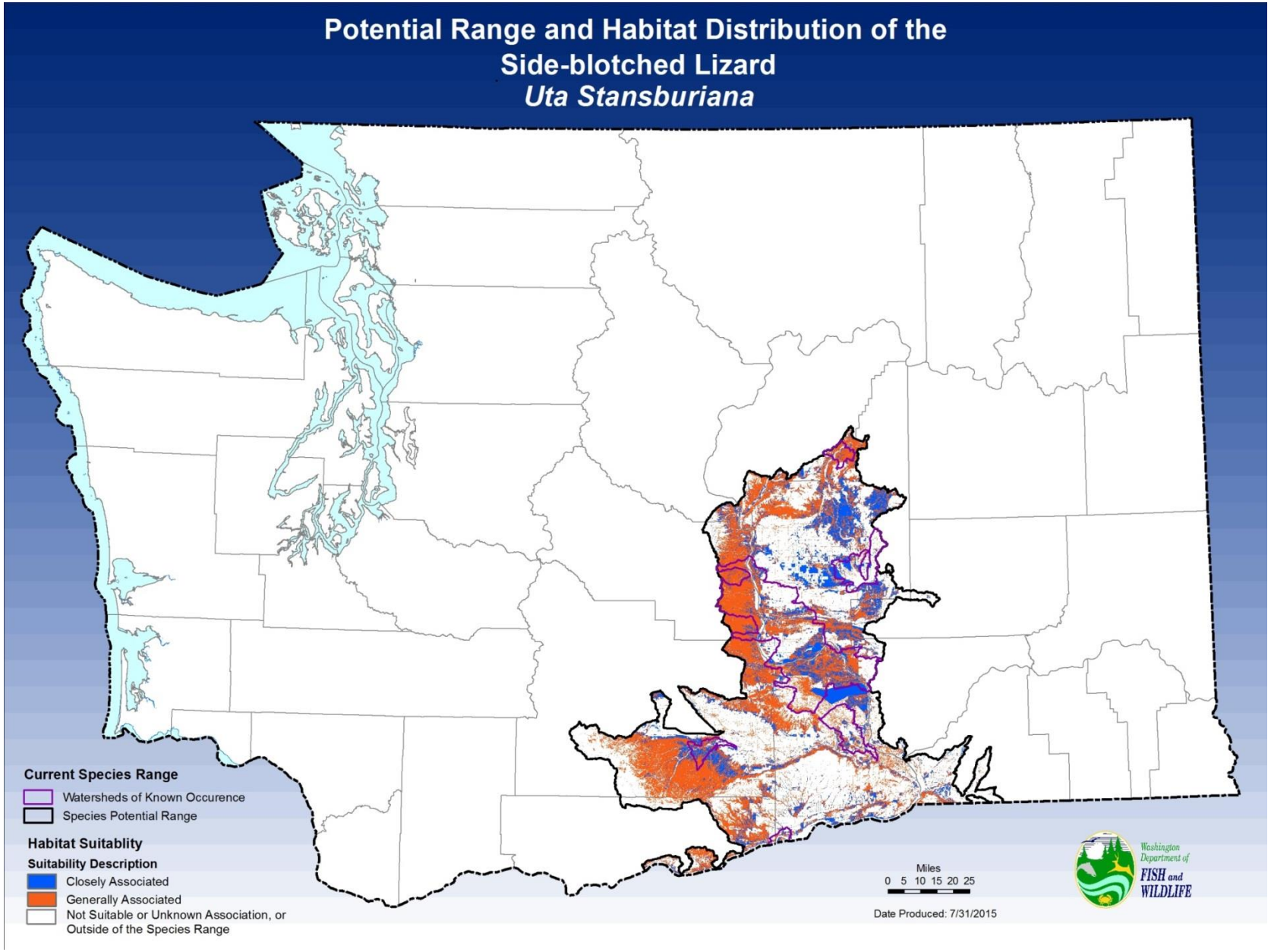
Sagebrush Lizard



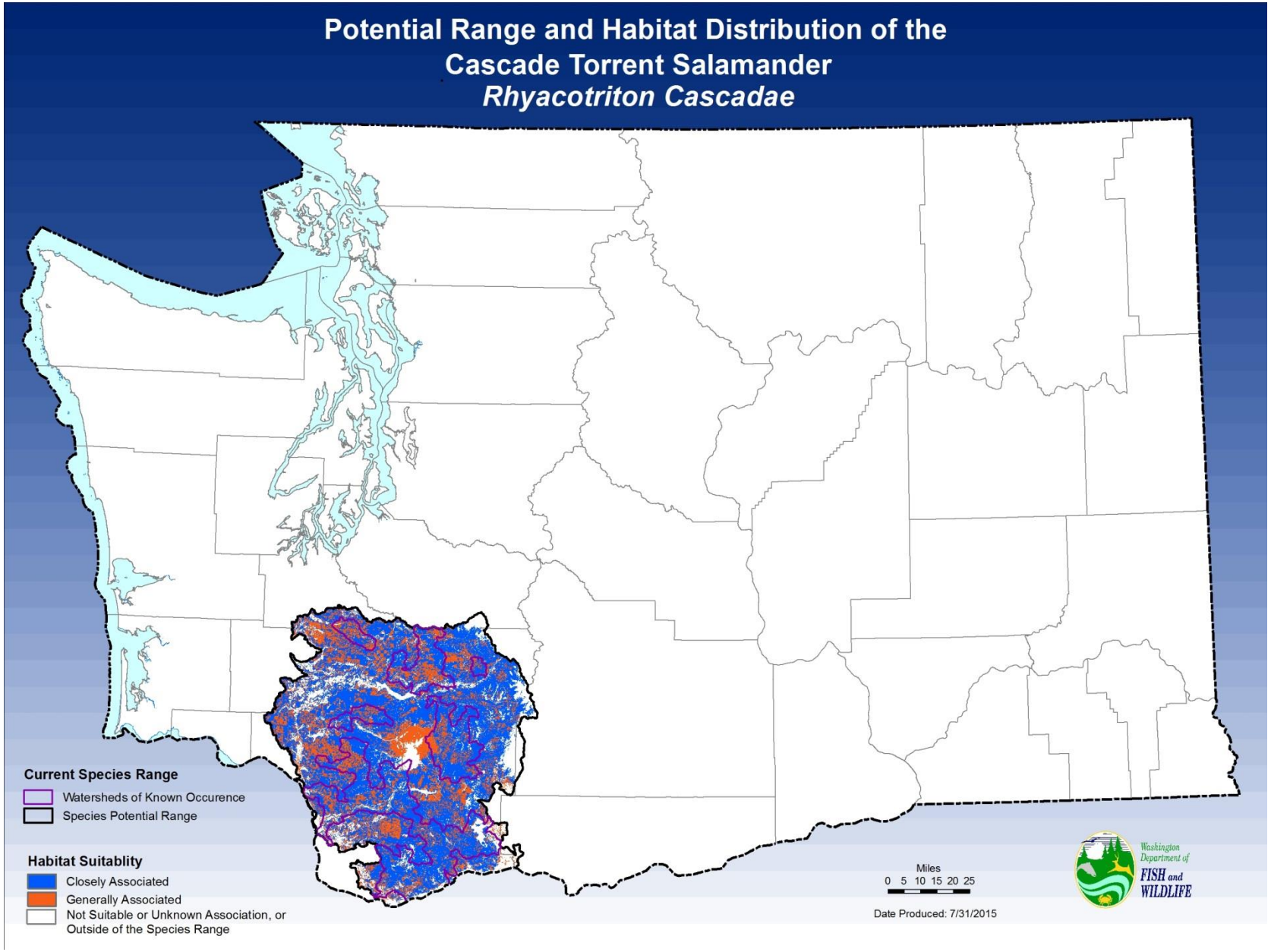
Sharp-tailed Snake



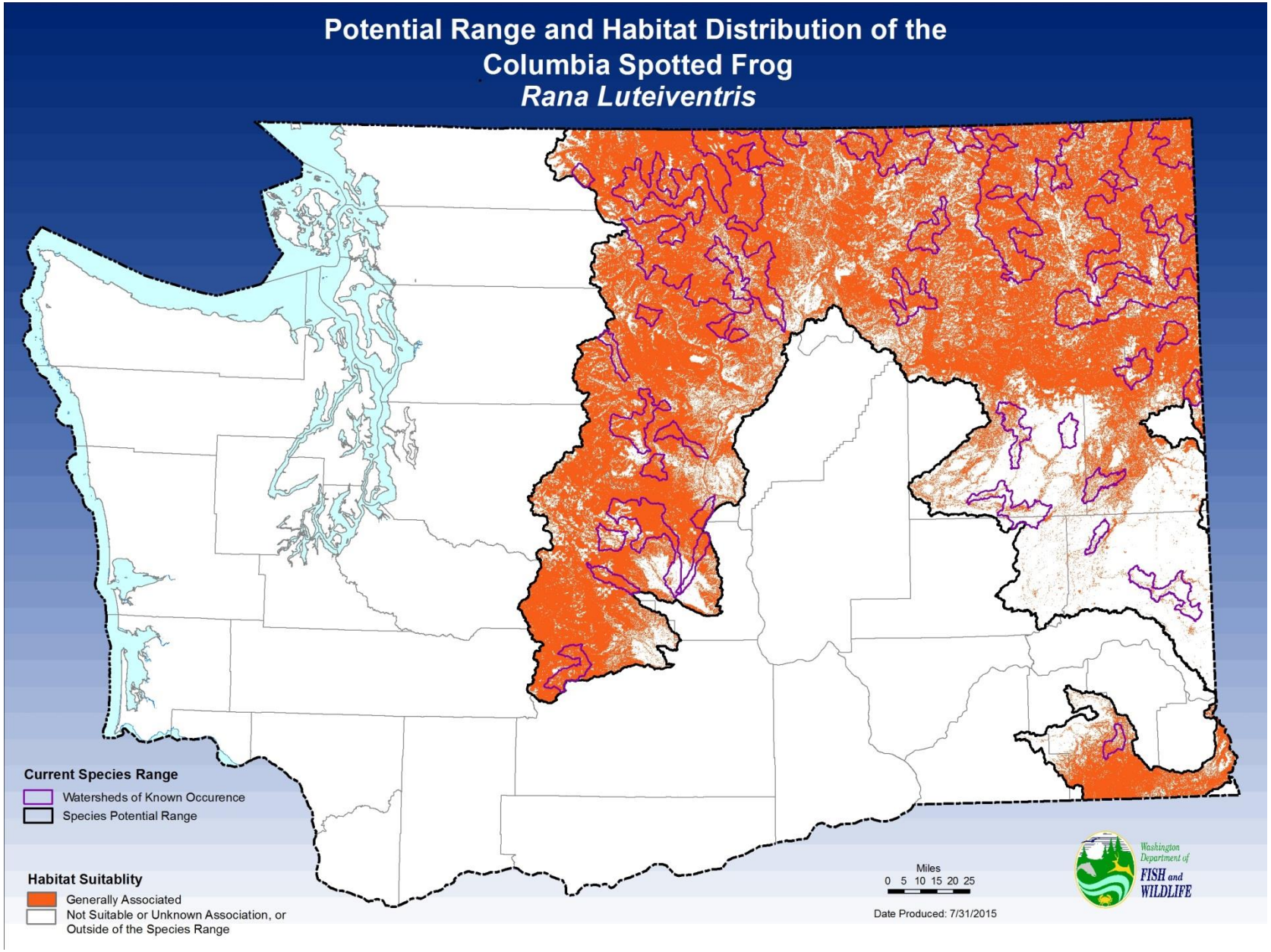
Side-blotched Lizard



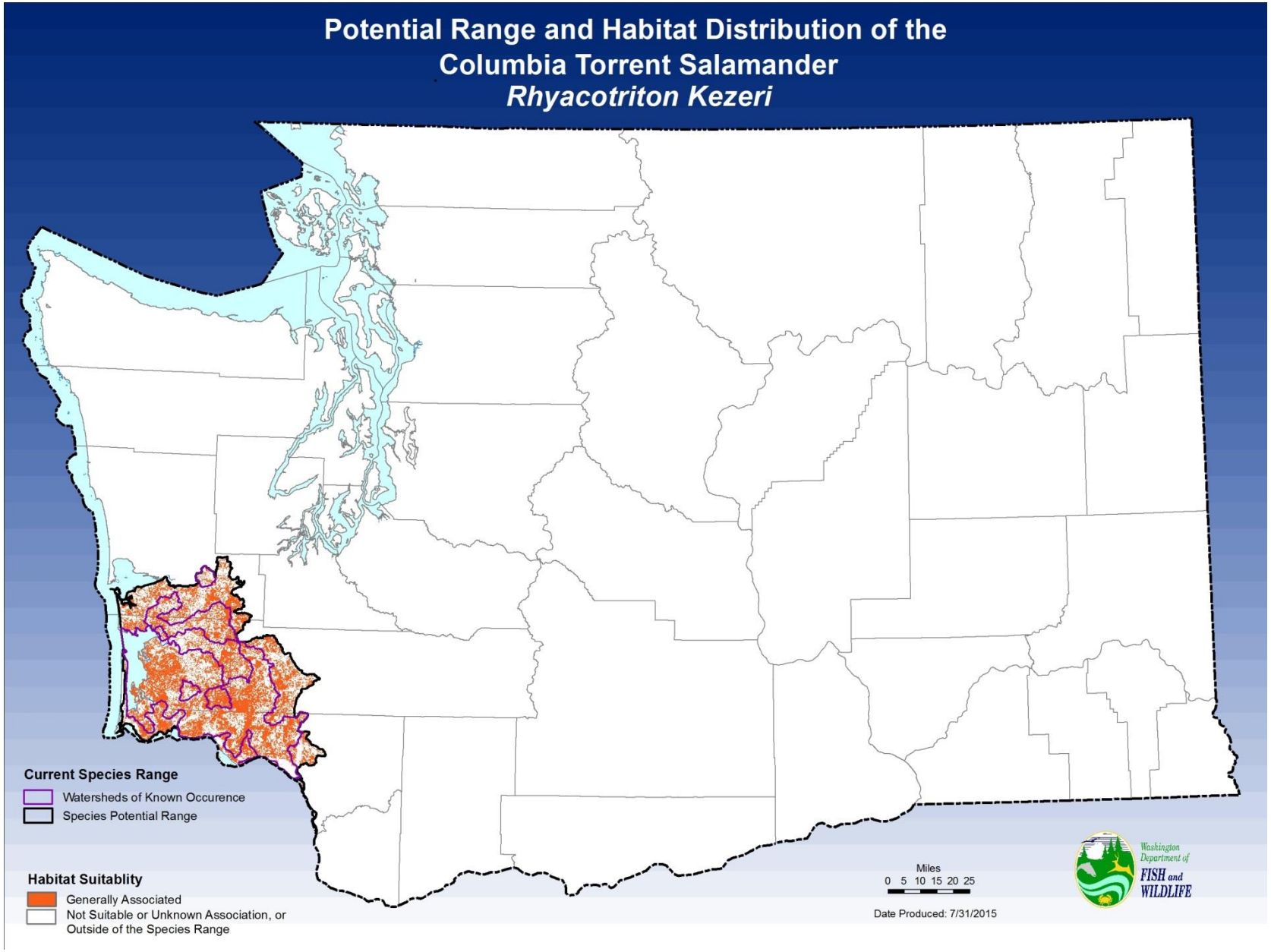
Cascade Torrent Salamander



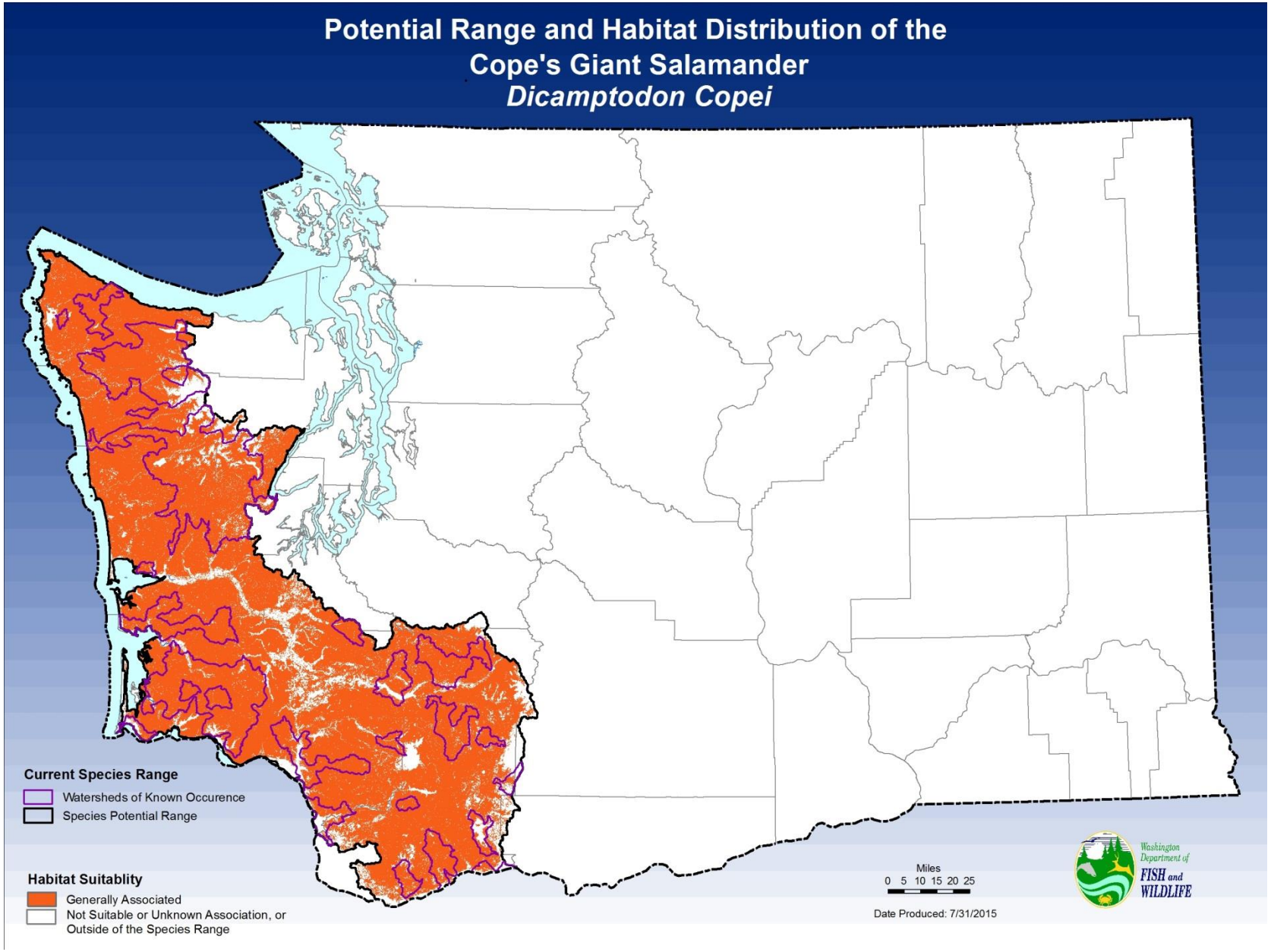
Columbia Spotted Frog



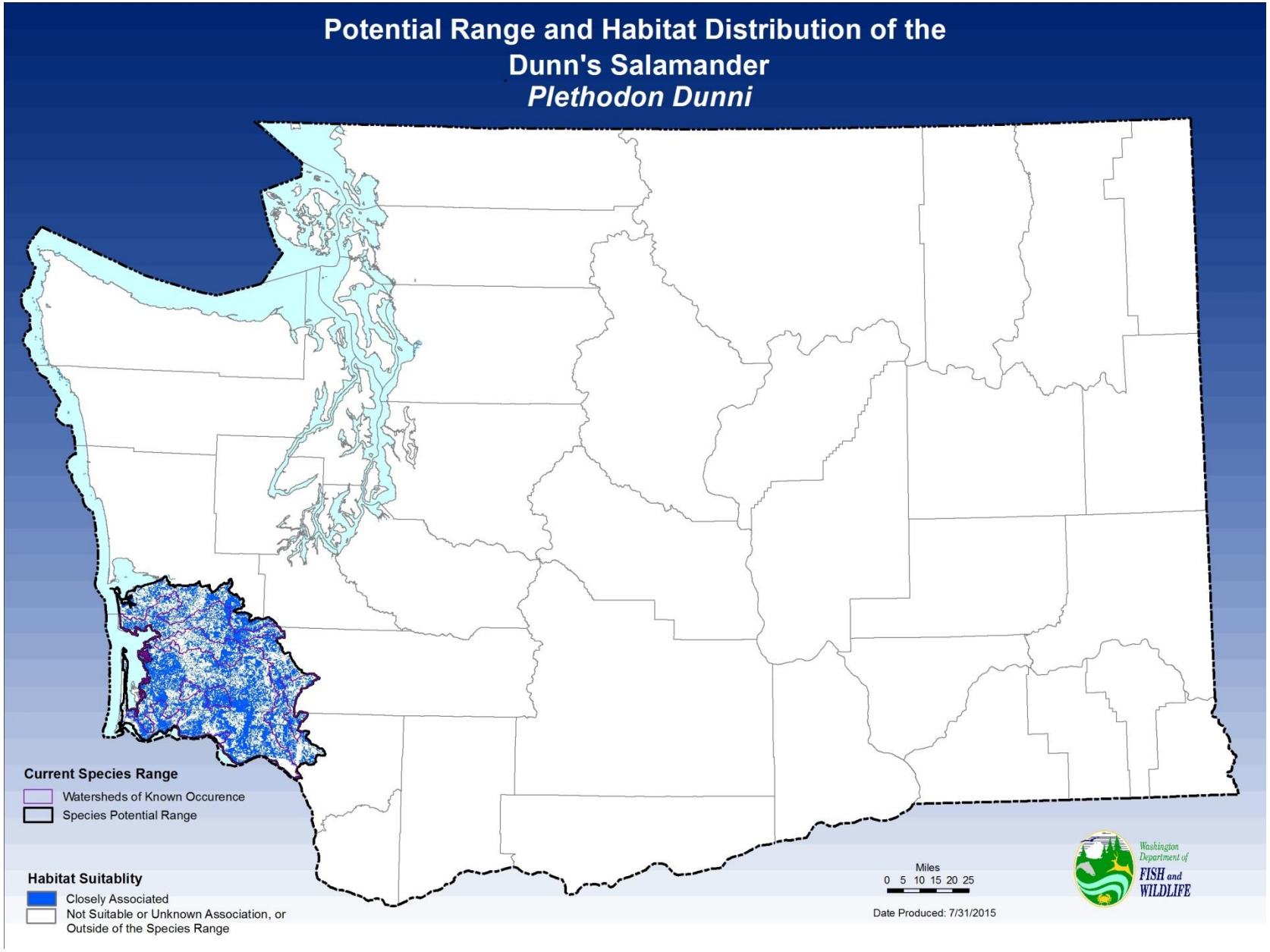
Columbia Torrent Salamander



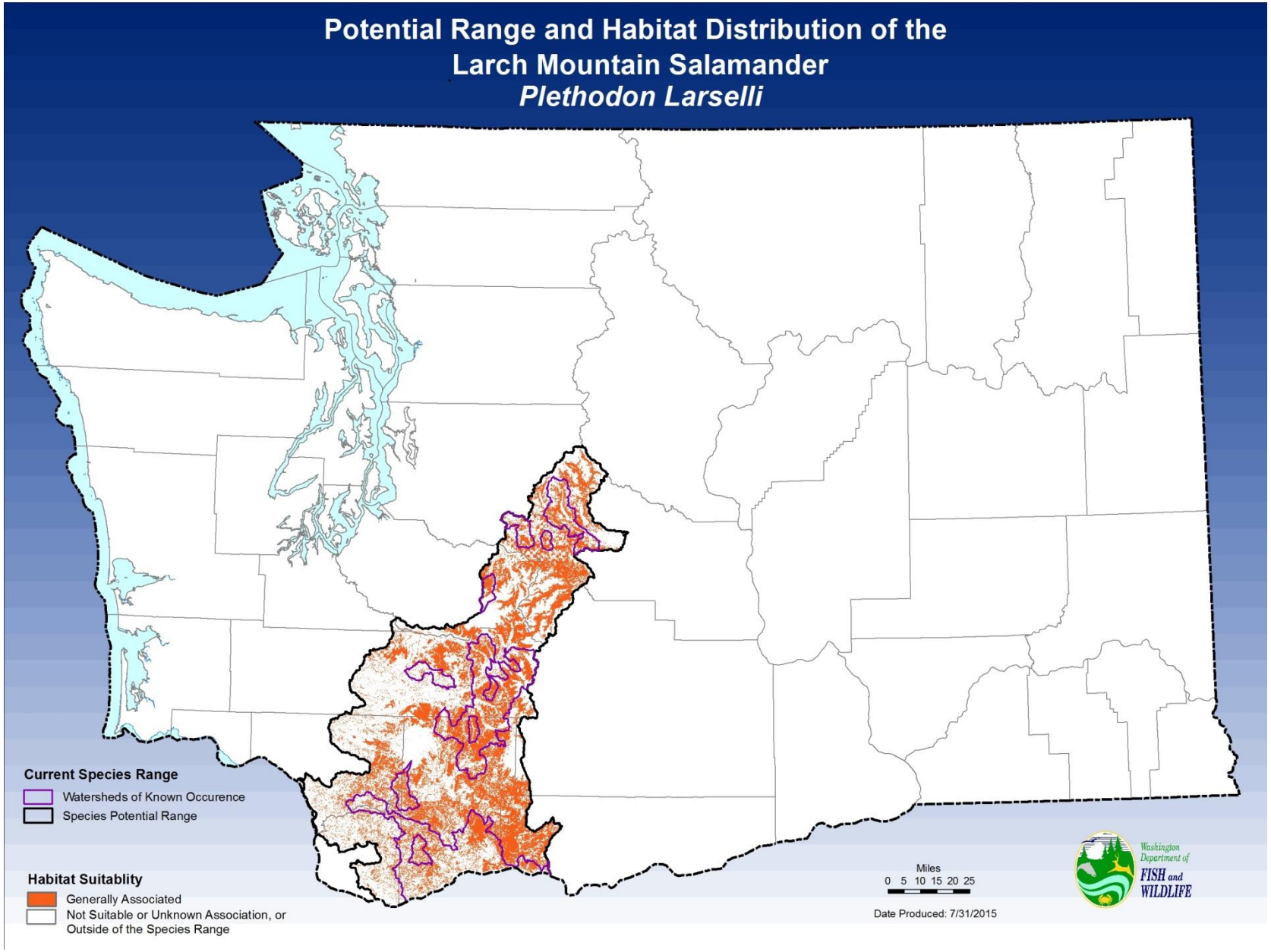
Cope's Giant Salamander



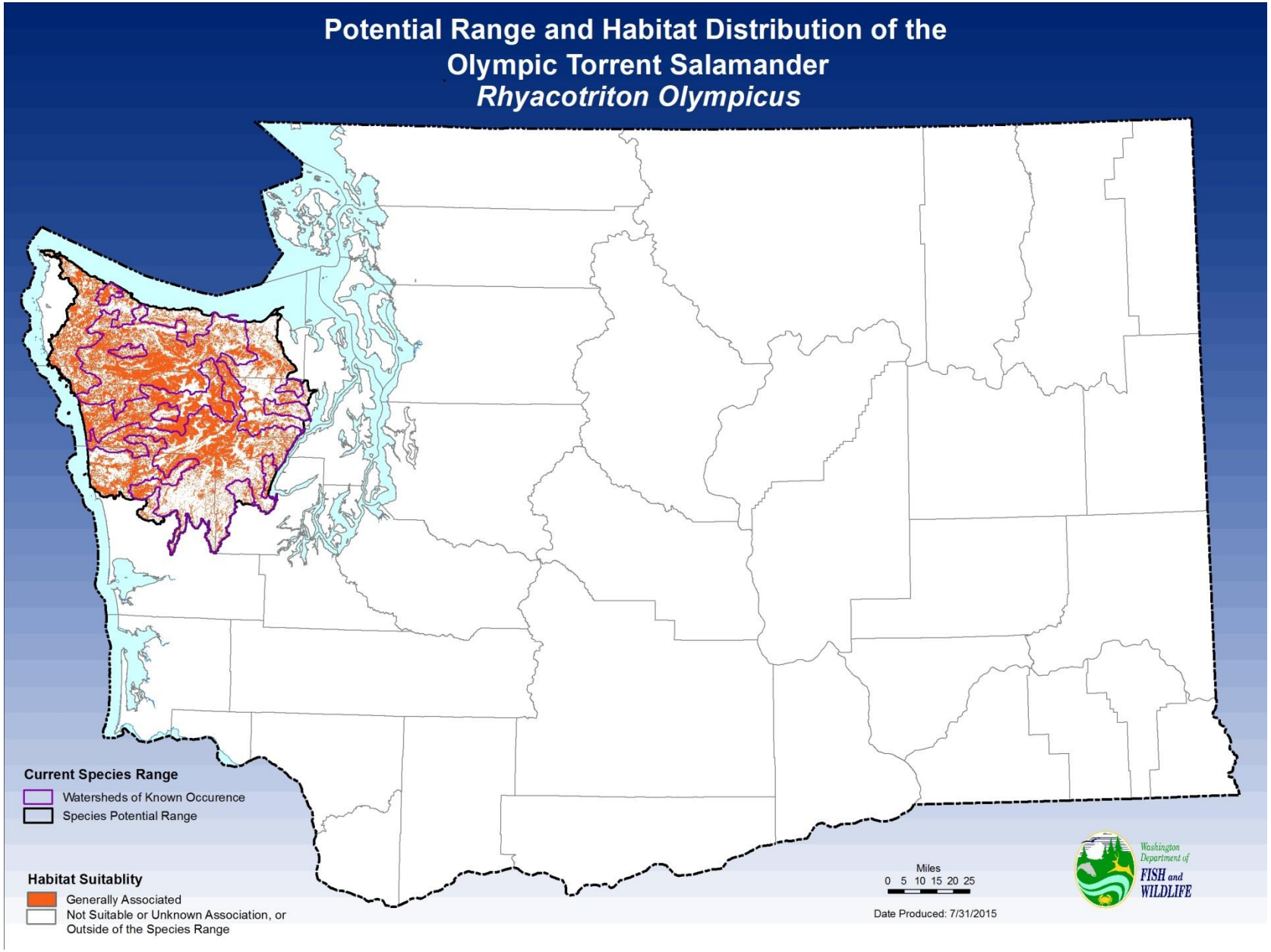
Dunn's Salamander



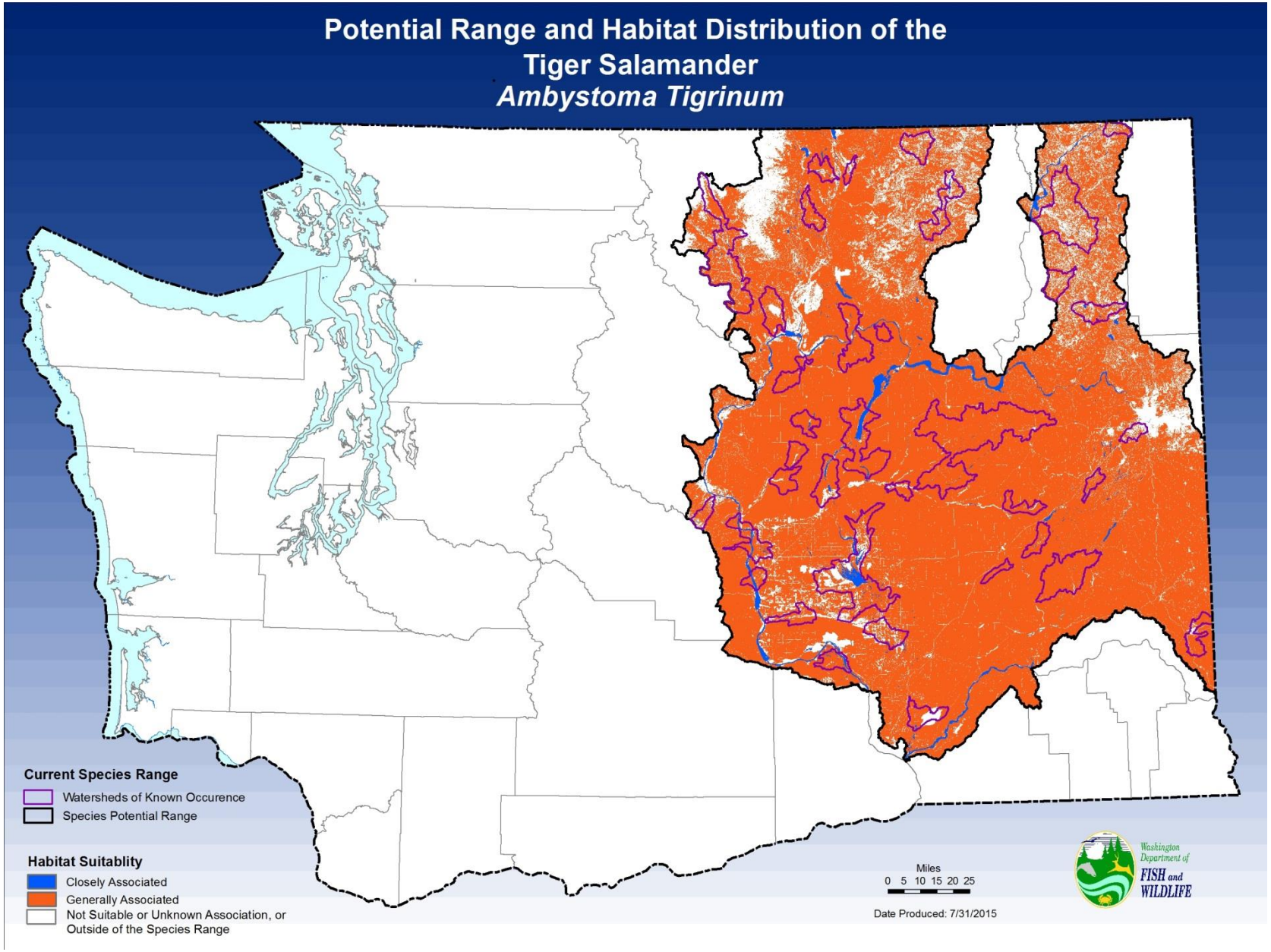
Larch Mountain Salamander



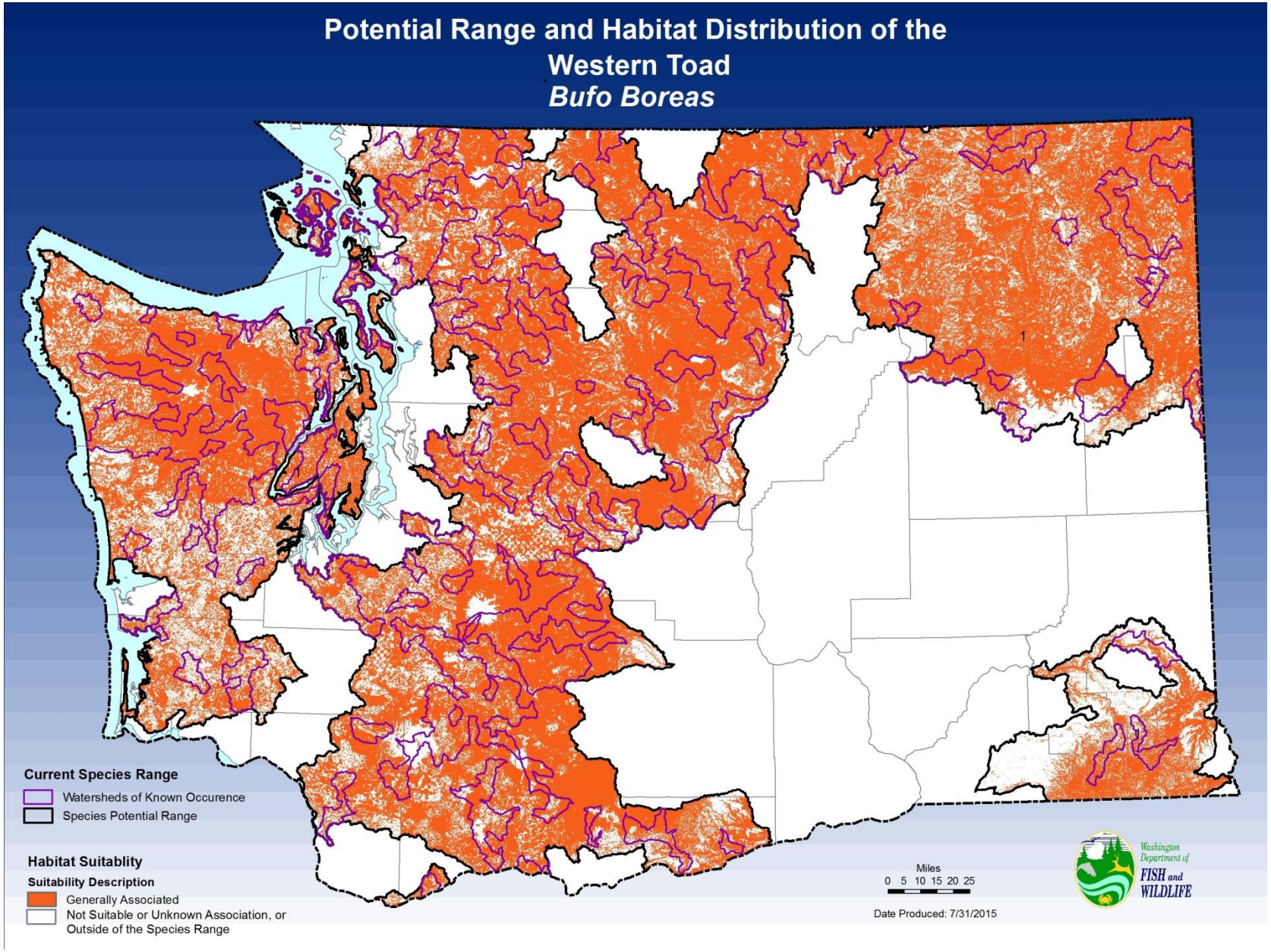
Olympic Torrent Salamander



Tiger Salamander



Western Toad



Woodhouse's Toad